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AN ENQUIRY
Into the Source from whence the Symptoms of the
SCURVY
AND OF
PUTRID FEVERS,
ARISE;
And into the Seat which thoſe Affections occupy in the
ANIMAL OECONOMY;
With a View of aſcertaining a more juſt Idea of
PUTRID DISEASES
Than has generally been formed of them.

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And lately one of Dr. RADCLIFFE's travelling Phyſicians.

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> Ξυγκαταινέω μεν οὖν καὶ τὸν λογισμὸν ἣν περ ἐκ περιπτώσιος ποιῆται την αρχην καὶ τὴν καταφορὴν εκ των φαινομένων μεθοδεύη.
>
> V. Hippocratis Coi Præceptiones.

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G.R III.
BRITISH MUSEUM

TO THE

RIGHT HONOURABLE

LORD SOUTHAMPTON.

MY LORD,

PERMIT me to take this public opportunity of offering You my acknowledgments for the kind protection and countenance You have upon various occaſions ſhown me. Allow me alſo the honour of inſcribing to Your Lordſhip the following pages; which, though upon a ſubject not immediately within the line of Your occupations, yet, relating in part to the preſervation of a claſs of people ſo eminently ſerviceable as our Seamen, cannot be wholly unintereſting to You, who have the welfare of Your country ſo much at heart.

I have the honour to be, with great reſpect,

MY LORD,

Your Lordſhip's obliged

And obedient humble Servant,

FRANCIS MILMAN.

PREFACE.

IT has been remarked with ſome reaſon, but with a degree of ſurprize, that, although the hiſtory of diſeaſes has of late years been conſiderably improved, the Science of Phyſick (if I may be allowed the expreſſion) has made very little progreſs; and that, although the various diſorders, which have engaged the attention of writers, have been deſcribed with uncommon accuracy, we have been far from attaining a thorough knowledge or comprehenſion of their natures, or from being able to give a rational explanation of their ſeveral ſymptoms. This circumſtance, I am apprehenſive, will, by many perſons, be conſtrued to the prejudice of our profeſſion. Ingenuity may take occaſion from it to queſtion the ſolidity of the firſt principles upon which our opinions

nions have been grounded, and may with plauſibility alledge, that the foundation of a ſtructure may with ſome reaſon be ſuſpected, which the addition of materials is incapable of advancing.

To ſatisfy ourſelves, and to remove the doubts of others, it may become us to review the leading notions which have guided us, and to examine whether we may not unwarily have committed ſome miſtakes in the fundamental principles which we have adopted; and whether it may not have proceeded from thoſe original errors, that our art has not advanced, either in the manner which could have been wiſhed, or in the degree which might have been expected.

When profeſſors would teach us that every diſeaſe conſiſts in ſome peculiar vice or depravity of the blood, it is certainly their duty to aſſure themſelves of the exiſtence of ſuch vice or depravity; they ought to acquaint us with the ſpecific nature of it in each caſe, and to inform us by what particular marks it is to be known and diſtinguiſhed. Without theſe conditions, ſuch vices or depravities can pretend to nothing more than the name of Occult Qualities; and the doctrines founded upon them are entitled to no more reſpect than thoſe ſyſtems of philoſophy which were founded upon a ſimilar baſis.

As the chymiſtry of our fluids in an healthy ſtate, and their depravations in diſeaſe during life, are ſtill acknowledged to be hidden in obſcurity, it is no ways extraordinary, that thoſe who have taught the above leſſons ſhould have been deficient in the particulars juſt mentioned: but it muſt ever be matter of aſtoniſhment, that, without ſuch ſatisfaction, men of learning ſhould have received their groundleſs aſſertions as eſtabliſhed truths; that they ſhould have condeſcended to make uſe of ſuch ideal properties to account for the real phenomena of diſeaſes, or that any one ſhould have given to ſuch viſionary hypotheſes the name of Sound Theories.

Some authors, indeed, who have maintained thoſe opinions, have attempted, in a few inſtances, to point out the ſuppoſed nature of the vitiated ſtate of the blood: it has been ſaid to be putrid in one diſeaſe, and to be acrimonious in *another. They have even pretended, in particular caſes, to define the ſpecific nature of the acrimony which prevails. To conſider minutely how far, or with what exactneſs, each of thoſe ſtates or conditions of the blood have been diſtinguiſhed by writers, would lead to much too extenſive a field of argument for me to undertake. Some few circumſtances, indeed, relating to a general and a particular acrimony, muſt, in the courſe of theſe pages, be neceſſarily produced. But the ſtate of the blood firſt mentioned will be the principal object of my preſent diſcuſſion.*

And here, though the term Putrid, when uſed to expreſs the corrupt ſtate of the dead ſubſtances of animals, has a preciſe and an obvious meaning, I would aſk, whether there is not ſomething extremely vague and equivocal in its ſignification, when applied to the diſeaſes of the animal œconomy? Putrid diſeaſes are ſaid, by many authors, to conſiſt in a putridity of the blood. But, though the temerity of practitioners of various deſcriptions has led them to perform veneſection in the moſt virulent caſes of this claſs,

claſs, though the ſenſible qualities of putridity are ſuch as could not eaſily eſcape notice, where are the inſtances recorded of putrid blood drawn from the living body? or where is the phyſician of character who would aſſert, that a putridity of the vital circulating fluid would be for a moment compatible with animal life? Putrid diſeaſes have been ſaid, then, to be conſtituted by a cauſe which cannot exiſt. The doctrines, which have been founded upon this idea, will be ſhown to have been no leſs pernicious in their tendency, than groundleſs in their principle, and to have biaſſed improperly both our attempts to prevent and our endeavours to cure thoſe complaints.

The hiſtories of the Scurvy, and of Putrid Fevers, will, I truſt, furniſh me with particular and ſtriking proofs of theſe general aſſertions. My enquiry into the accounts of the former diſeaſe, may conduct us to the cauſes of our long failure in preventing its ravages, and may, perhaps, aſſiſt us in explaining the reaſons of Captain Cooke's ſingular ſucceſs in the attain-

*ment of that object *. Experiments on the actual ſtate of the blood, both in the ſcurvy and in putrid fevers, made by the moſt able and unprejudiced phyſicians, will be adduced to ſhow how extremely miſtaken thoſe perſons have been, who have referred the proximate cauſe of the former to a putrefaction of the blood, gradually accumulated; and of the latter, to a quick and*

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* The parts of the following book, which relate to the Scurvy, were read in July 1780 as the Gulſton Lectures at the College of Phyſicians. This enquiry was firſt inſtituted merely to diſcover the cauſes of Captain Cooke's ſucceſs in preſerving his men from the ſcurvy, and to account for the ſymptoms of that diſeaſe. It was not my intention, at that time, to have purſued the ſubject of putridity in living animal bodies any further. There are ſome expreſſions at the beginning of this book which ſeem to ſhow it; and, as I have not thought proper to alter them, it may not be amiſs to mention that circumſtance here to explain them. It may likewiſe not be improper to add, that the learned and ingenious Sir J. PRINGLE, who is often referred to in this book, died when the impreſſion of it was conſiderably advanced.

*a ſudden corruption of it. Theſe inſtances, whilſt they may ſerve to prove the opinion, will teach us to admire the diſcernment, of one of the moſt reſpectable and moſt learned phyſicians of the age; who has long ſince obſerved, that "the more we are acquainted with the animal œconomy, the more reaſon we find to believe that the ſeat of diſeaſes is not in the blood; with the ſenſible qualities of which it ſeems to have very little relation *."*

I ſhould not dwell ſo long upon theſe points, but from a conviction of the beneficial conſequences which muſt neceſſarily reſult from a refutation of ill-grounded prejudices in matters of phyſick. I am not, however, unmindful, that ſuch arguments tend only to eſtabliſh a negative doctrine of putrid diſeaſes. When I ſhall have invalidated the common notions which have been entertained of them, it will therefore be my endeavour to ſupply this defect, by aſcertaining

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* See Dr. Heberden's Papers in the Medical Tranſactions of the College.

ſome principles upon which our opinions of them may with more certainty reſt. This, as the moſt difficult, ſo is it the moſt important part of my taſk; and, as its importance is the circumſtance which incites me to the attempt, ſo, I flatter myſelf, its difficulty will procure me the indulgence of the public for any trifling overſight in the execution of it. To guard, as much as poſſible, againſt every ſort of error, I ſhall firſt enumerate the prediſpoſing and occaſional cauſes which have been obſerved to be concerned in producing putrid diſeaſes; and, by a cloſe attention to their effects, from the firſt change with which they affect the body to the moſt morbid alteration, I ſhall attempt to diſcover the proximate cauſe of theſe, or the immediate ſource in the œconomy from which putrid ſymptoms ariſe. This reaſoning a poſteriori *I ſhall adopt, as the ſafeſt and as the only one which, in my opinion, ſhould be admitted on medical ſubjects. From this mode of inveſtigation I am induced to believe we ſhall learn, that the firſt morbid effects of the remote cauſes of theſe diſeaſes, the firſt* *diſcernible alterations produced by them in the animal œconomy, will be to be found in an impaired ſtate of the ſolids—of the moving muſcular fibres. I ſhall make it my buſineſs to ſhow, not only what that morbid change in the ſolids conſiſts in, but by what means it is to be known and diſtinguiſhed. Nor ſhall I, for this purpoſe, refer to any precarious or doubtful ſigns — to any imaginary properties, like the chymical qualities of the blood before-mentioned; but to ſome conſtant and ſenſible marks, perceivable in the altered manner in which the various functions of the body, its voluntary and involuntary motions, are performed. The principles I ſhall lay down will, I flatter myſelf, not only conduct us to the true and genuine ſource of putrid ſymptoms in general, but in ſome degree aſſiſt us in the ſolution of the variety of them in different caſes.*

The methods and the medicines made uſe of for the cure of the various modifications of putrid diſeaſes will be deſcribed, and ſuch of them will be recommended as have been moſt approved by experience. The hiſtory of this part of my ſubject will ſhow, that the opinions which I ſhall preſume to reject, have led to a very inefficacious and unſucceſsful mode of treating diſeaſes of this claſs; and the preſent moſt advantageous methods of curing them, taught us, perhaps, like many other important leſſons, by accident, will afford a ſtrong confirmation of the doctrines I ſhall advance, and may ſuggeſt ſome uſeful hints to direct and to reform our practice, in thoſe caſes in which a want of ſucceſs may indicate a defect of it. The explanation of the qualities of the remedies uſed in all theſe caſes, will neceſſarily lead me to the conſideration of the doctrine of antiſeptics, as it has of late years been introduced into the ſyſtems of phyſick, and is now taught in the ſchools. I ſhall examine into the principle upon which it was firſt applied to the prevention and cure of putrid diſeaſes. I ſhall enquire how far experience has confirmed our hopes of benefit from this ex-

tenſive claſs of medicines; and, as the advantage we have derived from them will not, I am apprehenſive, correſpond with the expectations which had been formed, I ſhall endeavour to account for our diſappointment.

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ERRATA.

Page 63, Note, line laſt but 2, for "Recerche" read "Ricerche."
Ibid, —— line laſt but 1, for "Felicie" read Felici."
94, Note, line 9 from the bottom, inſert "the" before "too great quantity."
163, Line 2, for "we" read "I."
167, Line 8, for "We" read "I."

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INTRODUCTION.

IT has long been a ſubject of ſerious regret, that the occupation of a ſeaman, in its nature, perhaps, the moſt uſeful to ſociety, ſhould, at the ſame time, be the moſt fatal to human life. Salutary as the effect of ſailing has in general been eſteemed, it muſt appear extraordinary, that a greater mortality ſhould have ariſen from the virulence of diſeaſe, than from any accidents or inclemencies of the ſeaſons. In the war preceding the laſt, more perſons were ſaid to have been deſtroyed by the ſcurvy alone, than to have periſhed by the wreck of ſtorms, and the united efforts of our combined enemies. Great, however, as is the number of ſeamen which have been carried off by this diſeaſe in a ſhort channel cruize, amounting frequently in an inconſiderable fleet to many hundreds, a late celebrated navigator, with a company of one hundred and eighteen men, actually performed a voyage of three years and eighteen days, through all the various climates, from 52° north to 71° ſouth lat. with the loſs only of one man. The ſcurvy then, in a virulent degree, is not a neceſſary or an unavoidable attendant on the condition of a ſeaman. Its malignity ſurely muſt have ariſen from negligence and ill management; ſince, by ſuperior ſkill and judgment, it can be ſo effectually prevented.

To examine into the cauſes which have heretofore baffled our attempts to preſerve the lives and the health of our ſailors, and to conſider the means by which thoſe objects have lately been ſo well attained, may be matter of uſeful and curious enquiry. To reviſe the ſpeculative opinions and doctrines upon which our former fruitleſs preventives were founded—to correct the errors of our ſyſtems by the experience and the wiſdom of Captain Cook, however humiliating to the medical profeſſion, may certainly be beneficial to ſociety. His voyage, if viewed without prejudice, may thus be doubly inſtructive. In the practice of the methods which he uſed, the ſeaman will learn to provide for his ſafety from diſeaſe in the longeſt navigation. And as the knowledge, how the cauſes of the ſcurvy may in ſome inſtances be ſucceſsfully oppoſed, cannot fail to throw conſiderable light on its genuine character, the phyſician will be taught to improve his notion of it; and the accuracy thus acquired may perhaps enable him to deliver ſome general rules for its prevention, not only in naval expeditions, but in every ſituation in which it is liable to occur.

Premiſing, therefore, a ſhort account of ſome of the moſt ſtriking features of the ſcurvy, I ſhall enter into a detail of all the prediſpoſing and occaſional cauſes, which have been any where, or at any time, found to contribute to its production. This will be the more neceſſary; becauſe, as it will appear, on the one hand, that upon a due conſideration of theſe only, a general and a rational mode of prevention can be founded; ſo will it be ſeen, on the other, that from a neglect of theſe, or from a miſapprehenſion of their tendency, all our former miſcarriages have entirely ariſen.

The diſtinguiſhing marks of the ſcurvy are, a great weakneſs of the whole body, increaſing gradually and ſlowly for days and weeks together, and accompanied with a laſſitude or ſenſe of fatigue, which has the peculiarity of being more ſenſibly felt after ſleep, than on going to reſt. The gums bleed on a ſlight touch. They ſeparate from the teeth, and become fungous and putrid. The breath is very offenſive; and livid purple ſpots are often ſeen in different parts of the body.

CHAP. I.

Of the Prediſpoſing Cauſes of the Scurvy.

THE circumſtances which give a prediſpoſition to this complaint, are various and numerous.

1ſt. They are obſerved to be particularly ſuſceptible of it, whoſe health has been impaired by preceding illneſſes. When it attacked the Imperial army in Hungary with great virulence, the perſons who ſuffered principally were thoſe who had been previouſly weakened by frequent relapſes into long and dangerous fevers *.

2dly, Indolence inclines people greatly to this calamity. The lazy and the inactive—the perſons in a ſhip's crew termed ſluggards by the ſailors—are the firſt attacked. It is known to be particularly incident to thoſe whoſe condition on board ſhip exempts them from much exerciſe. The Centurion, in which Lord Anſon ſailed round the world, affords a ſtriking example of it. For of fifty invalids on board her, four only ſurvived; and of ſeventy marines, all but eleven died of the ſcurvy. In the Dutch ſervice it has likewiſe been obſerved, that if there were ſeven on board who had the ſcurvy *, four of theſe were marines, though the number of marines was much leſs than that of the ſailors †. On ſhore it invades perſons of ſedentary occupations more readily than thoſe who are engaged in more active ſcenes of life. For where the ſcurvy is endemic, the ſedentary mechanic will ſuffer, whilſt the laborious plowman will eſcape.

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* See Kramer.

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* Vide Rouppe de Morbis Navigantium.

† To this fatality among the marines their berths on board ſhip probably contribute likewiſe; the place allotted to them is the bay or fore part of the lower-gun deck, which is often wet and moiſt.

3dly. But it is not the want of exerciſe only which is pernicious, the exceſs of it is equally prejudicial. A man exhauſted by fatigue is as liable to the attack of this diſeaſe, as one who is enervated by indolence. The phyſician * to the Ruſſian army informs us, that the exceſſive fatigues of the troops which marched to Oczakow, were the principal reaſon why ſo great a number of them ſuffered from the ſcurvy. Beſides the difficulties of their march, the old regiments had previouſly undergone great hardſhips during the winter; and the greateſt part of the recruits, he adds, did not join the army ſooner than when it was ready to march, or already in actual motion; and that though theſe were generally young raw fellows, exceſſively wearied after a long and tedious journey, yet it was not poſſible then to grant them any reſt or refreſhment. Being directly

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* See Dr. Nitzſch's Account, in Dr. Lind's Book on the Scurvy.

incorporated into the ſeveral regiments, and entering at once into a new way of life, they were ſoon exhauſted by military hardſhips, to which they had never been accuſtomed. The circumſtances attending their marches did not at all alleviate the diſtreſs ariſing from the length of them. They were begun early in the morning, in the midſt of thick fogs or cold dews. Towards the middle of the day the men were either oppreſſed with intolerably ſcorching heat and clouds of duſt, or with heavy rains. The march was often protracted till noon, and ſometimes beyond that period, according as water, wood, and forage, were to be met with in thoſe deſert places. Thus the ſoldier, after a tireſome journey, often quite ſpent with thirſt, and enfeebled by the exceſſive heat of the ſun, arrived at laſt in camp. But even here no reſt could be permitted him. He was obliged, according as it was his turn, to go upon the piquet, or centinel's duty. — The hardſhips which the ſick underwent, were ſtill greater; they were carried in open carts, expoſed to all the various inclemencies and viciſſitudes of the climate —to rain, to duſt, to heat, and to cold. They began their march long before, and ended it long after the reſt of the army. They were then taken out, and frequently laid upon the cold wet ground, under moiſt canvas—a ſource of diſeaſe which the moſt robuſt conſtitution, much leſs an infirm one, could hardly reſiſt. But though the Ruſſians are among the more ſtriking examples, they are not the only inſtances of the ill effects of fatigue, in inclining perſons to this complaint. When the ſcurvy raged in Canada in 1759, the extraordinary hard duty of the ſoldiers was ſuppoſed to have contributed to its production.—An ingenious gentleman obſerves, that the reaſon why ninety perſons were attacked with the ſcurvy at Fort-William, whilſt only two ſoldiers out of four companies were ſeized with it at Fort-Auguſtus, and but one in a captain's command at the barracks of Bernera, was partly owing to the duty being more ſevere at the firſt, than at the latter places.—As the ſoldier, though indulging for the moſt part in habits of indolence, is expoſed, at times, to the moſt wearing exertions of ſtrength; ſo likewiſe the condition of the ſailor is, in this reſpect, ſubject to great viciſſitudes. In general more apt to ſuffer from too little exerciſe, than from too much labour, the ſeaman is however, at times, forced to undergo the moſt extreme degree of fatigue. A ſhip's crew is ordinarily divided into two claſſes or companies, each of which takes its turn to watch four hours at a time. By this means every man has four hours reſt for four of duty. This remiſſion from labour, if it could be wholly devoted to refreſhment and ſleep, would be fully ſufficient to recruit the ſtrength of men but little reduced by the ordinary duty of the ſhip. But in rainy and tempeſtuous weather, as the ſeverities of duty increaſe, the means of reſt and refreſhment diminiſh. Before he has time to dry himſelf, and to get warm in bed, the ſailor is recalled to his poſt, and undergoes the ſame toil he had juſt quitted. Deprived in this manner of the reſtoring benefit of ſleep, his ſtrength is gradually worn down, and he is rendered ſuſceptible of diſeaſe from the ſlighteſt cauſes. It was partly owing to this circumſtance, that the crew of Lord Anſon's ſquadron, at a moment when they leaſt expected it, in the mild climate of the coaſt of Mexico, where they had a plenty of good water and freſh proviſions, were ſo miſerably afflicted with the ſcurvy. The number of his men, at this period, was ſo reduced, that all on board the ſquadron did not amount to the complement of a fourth rate man of war. An harder taſk of duty fell of courſe to the lot of thoſe who remained. Thus circumſtanced, they were beat about for ſeven weeks by variable and contrary winds; and their ſhips at this time too were ſo leaky and ſhattered, that the officers, as well as the men, were obliged to work continually at the pumps.

4thly, The moſt frequent and moſt conſtant prediſpoſition to this complaint, is derived from cold and from moiſture. Hiſtory gives us very few inſtances of any extraordinary ſcenes of diſtreſs ariſing from the ſcurvy, in which either one or both of theſe cauſes combined have not exerted their influence. It was the obſervation of an early writer on this diſeaſe, that cold damp lodgings contributed greatly to its production — that its malignity was increaſed by raw exhalations from the wet and damp walls of houſes; but that people living in drier apartments were leſs ſubject to it. When it made ſuch havock on board Lord Anſon's ſquadron, on his doubling Cape Horn, the weather had been very tempeſtuous. Great waves rolled continually over the ſhips. Cutting winds, bringing ſnow and ſleet with them, benumbed the limbs of the ſailors. In like manner, at the ſiege of Azoph, when the Ruſſian army ſuffered alſo very ſeverely from it, the ſoldiers had been expoſed to very piercing cold weather, accompanied with frequent rains, ſleet, and ſnow. It is from theſe cauſes, that in northern latitudes, and in moiſt ſwampy ſituations, this diſeaſe is often found to be endemic. In Greenland it is ſaid almoſt always to ſubſiſt; and it was formerly in a very peculiar manner prevalent in the Low Countries—in Holland and in Frieſland. With but very few exceptions indeed, which will be hereafter mentioned, it is particularly incident to all the northern nations.

5thly. A gloomy ſorrowful ſtate of mind, is another circumſtance which gives a ſtrong prediſpoſition to this complaint. It attacks the diſcontented, the repining; whilſt perſons of more chearful diſpoſitions eſcape. Hence it is, perhaps, that newlyimpreſſed ſeamen are found to be particularly liable to it; and that the inhabitants of beſieged towns are obſerved to be very ſuſceptible of its impreſſions. Hypochondriacal people, and perſons of a melancholic temperament, have always been remarked to be ſo particularly prone to it, that the hypochondriacal diſorder, the atrabilious habit, and the ſcurvy, have, by many ancient writers, been conſidered as different degrees of the ſame diſeaſe: and the latter has been ſaid to proceed from a redundancy of the atrabiliary humours.

CHAP. II.

Of the Occaſional or Exciting Cauſes of the Scurvy.

THE occaſional or exciting cauſes, applied to perſons under any of the prediſpoſing circumſtances which have been mentioned, and co-operating with them, will produce the ſcurvy. Theſe exciting cauſes are principally three; a diet of difficult digeſtion; food containing but little nouriſhment; or, certain paſſions of the mind. The diſeaſe is moſt frequently occaſioned by a ſea-diet; which conſiſts chiefly of two ſorts of articles—unfermented, mealy, and farinaceous ſubſtances—and ſalted or dried fleſh and fiſh. The bread of ſeamen is hard biſcuit, which undergoes little or no fermentation in baking, and is conſequently of much more difficult digeſtion than well-leavened or well-fermented bread *. Their puddings are made of pickled ſuet, flour, and water, boiled together, forming a glutinous tenacious paſte, which requires the utmoſt ſtrength of the powers of the ſtomach to aſſimilate into nouriſhment. The other articles of what is called freſh proviſions are peas, or ground oats; which latter, boiled to a conſiſtence with water, are commonly called burgow, or are made into water-gruel, and drank of a morning for breakfaſt. Beef and pork preſerved by ſalt, butter and cheeſe, make out the ſeaman's ordinary bill of fare; for drink, government allows, where it can be procured, good ſound ſmall-beer; ſometimes brandy, rum, or arrack, according to the places where the ſhips are ſtationed.

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* See Dr. Lind's excellent book on the Scurvy; to which I am indebted for this obſervation, and for other very uſeful information.

The proviſions furniſhed by the Dutch government to the ſhips in their ſervice, though not exactly the ſame, are very ſimilar to thoſe with which our navy is ſupplied. The breakfaſt of their ſailors is grout, with beer as long as the beer laſts, and afterwards with water and vinegar. Their dinners and ſuppers are made on peas and ſtock-fiſh, with butter and vinegar, except on Sundays and Thurſdays, when their dinners conſiſt of peas and hog's-lard, with half a pound of bacon to each man. The bacon, though in leſs quantity, is ſubſtituted in the place of the Iriſh fiſh and fleſh, which being generally hard, dry, and ſalt, is now diſuſed. Beſides the above articles, a gentleman of great experience, who ſerved long in the Dutch navy, informs us, that they were ſupplied with pearl-barley, rice, and millet *. It is the opinion of a learned gentleman †, that a ſea-diet is only

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* See Dr. Rouppe, de Morbis Navigantium.

† See Dr. Lind's Book on the Scurvy.

prejudicial, as it is of difficult digeſtion, and that its pernicious effects do not ariſe from the ſalt it contains. I believe every view of the ſubject will tend to the confirmation of this idea. It appears from Dr. Lind's own experiments, that a long and continued uſe of ſalt-water will not give the diſeaſe to perſons in health; nor, when taken by perſons afflicted with an inveterate degree of the ſcurvy, does it add to its malignity. The ſpirit of ſea-ſalt has even been recommended as a means of preventing it. We ſhall find, on examining the hiſtory of the complaint, that perſons prediſpoſed to it, and living on any indigeſtible food, whether it be of an animal or vegetable nature—whether it be preſerved with ſalt, or not at all impregnated with it—will be equally attacked with the ſcurvy; and they are obſerved to ſuffer the moſt, who make the freeſt uſe of thoſe indigeſtible ſubſtances. The Dutch eat fewer hard and ſalted meats, and, living more on pearl-barley, rice, bread, &c. are leſs afflicted with it than the Engliſh. The diminiſhed frequency and ſeverity of the diſtemper among the Dutch ſailors, has indeed been aſcribed to a little pickled cabbage *, which they have been ſaid to eat at times with their food. But this notion is contradicted by the teſtimony of Dr. Rouppe, who obſerves, that in the voyages he made, cabbage was never given to the men. I have ſeen, ſays he, the officers eat them, but never remember to have ſeen the ſailors. The Ruſſian army had no ſalted proviſions whatever, but the ſcurvy attacked them with the greateſt virulence. Harraſſed and exhauſted as they had been by a long march in bad weather, when they arrived at their deſtination, and undertook the ſiege of Azoph, they had but little fuel to dry themſelves, or to dreſs their victuals. The fat indigeſtible fiſh of the river Don, which

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* Sawer-kraut.

was their food, being ill dreſſed, and their bread ill baked, produced frequent ſickneſſes, and precipitated them into this miſfortune. In the Imperial army, the officer and the ſoldier, the dragoons and the infantry, were all expoſed to the moiſt impure air of Hungary: but the ſcurvy attacked thoſe chiefly who, after frequent relapſes, and a final recovery from fevers, made uſe of a crude viſcid diet. The army had freſh beef in plenty; their other food conſiſted of the groſſer farinaceous ſubſtances, coarſe heavy bread, and a ſort of glutinous pudding, called "Rollatſchen." It is remarkable, that the Bohemians were the people who lived chiefly upon the laſt-mentioned article, and they were almoſt the only perſons who ſuffered from the ſcurvy. Van Swieten furniſhes us with a curious fact, to ſhew how any indigeſtible matter, irritating and weakening the ſtomach, may be apt to excite this complaint. He obſerved, that old acrid cheeſe (ſuch as is frequently eat in Holland) proved extremely prejudicial to perſons who were prediſpoſed to the diſeaſe, and exaſperated every ſymptom in thoſe who were already ſeized with it. Even after a recovery, he ſays, there was no cauſe which ſo certainly and ſo quickly brought about a relapſe, as the uſe of that indigeſtible ſubſtance. In 1633, the Dutch Greenland Company left ſeven ſtout ſailors to paſs the winter in that country, in order to get obſervations made on the climate, &c.: they were plentifully furniſhed with proviſions of every ſort from the ſhips; but this provident care proved a very baneful ſtore to them. Such an indigeſtible diet, concurring with the cold of ſo northern a latitude, rendered them ſcorbutic; and they became the miſerable victims of the curioſity of their countrymen. Not deterred however by the fate of theſe unhappy men, the Dutch Company, the year following, repeated the experiment in the ſame manner, and with the ſame event. It ſeems extraordinary, that they ſhould have profited ſo little by the example of eight Engliſhmen, who were accidentally left there in 1630: though wholly unprovided with any means of ſubſiſtence, from June till the month of May following, but ſuch as they could procure by their own addreſs and induſtry, they not only kept free from the ſcurvy, but every one of them ſurvived the diſaſter. They had neither bread nor biſcuit. They had no ſort of vegetable matter or ſpirituous liquor in their diet. Their drink was water; their food chiefly the fleſh of the rein-deer, of bears, and ſuch other wild animals as they could kill. Had the Dutch exerted themſelves to procure the ſame ſuſtenance, the iſſue of their experiments had probably been very different from what it proved; for the Engliſhmen whom we have mentioned, are not the only inſtances of perſons being preſerved from the ſcurvy by ſuch a diet. The fleſh of the rein-deer, though of the moſt animalized kind, and of the moſt alcaleſcent nature, as well as that of the bears, yet being of eaſy ſolution in the ſtomach, gives the Laplanders, inhabiting a cold northern region, a total exemption from the diſeaſe, whilſt their neighbours in a ſimilar climate, but living in a different manner, are miſerably afflicted with it.

2dly. Food containing but little nutritious matter, excites the ſcurvy, as well as ſubſtances of an indigeſtible nature. Hence it is frequently ſeen in the train of famine During a ſcarcity of corn, it ravaged the poor inhabitants of the colder diſtricts of Italy, near the Alps. They ſubſiſted frequently on the decoctions of a few roots, and often paſſed whole days without any food at all *. I had the honour to

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* Nam raro Polenta ex farina frumenti Turcici, eaque ſine ſale, iis pro cibo erat: ſed interdum paucis leguminibus, ſæpius duris herbarum radicibus, et groſſis, ubi ſuppeditaſſent, in aquâ coctis, inutilibuſque et inaſſuetis ejuſmodi cibis ſuſtentabantur atque etiam integros dies

to communicate to the College the caſes of two poor women, who living for more than three months on an infuſion of tea, without milk or ſugar, and on bread, without any other ingredient whatever in their diet, ſuffered the moſt inveterate degree of this complaint.

3dly. Certain paſſions of the mind are obſerved to be very apt to occaſion it. The

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dies ſine ullo cibo miſere conterebant. Hyeme igitur ac vere anni illius, morbus ortus eſt, ex quo laſſitudo et membrorum, quaſi ex labore, fatigatio, maculæque varii coloris in ſummâ cute oriebantur: os et ſpiritus malè olebat—gingivæ tumidæ, cruentæ, exeſæ, marceſcentes erant, dentes lababant, et alicui excidebant interdum omnes, quoque ſaliva acris effluebat. Genua cruraque vago dolore torquebantur, cum quodam torpore: poſt quem levior fiebat nervorum reſolutio. Interdum autem is dolor maximè urgebat, vel ubi pedes terræ inſiſtebant, non ſi ſe lecto æger continebat, vel ubi crura extendebantur: interdum hæc membra ita rigida erant ut complicari non poſſent. Inter hæc arteriarum pulſus exigui imbecilleſque erant. Ac multo plures fæminas quam viros laboraſſe inventum eſt, &c. V. Tractatum Johannis a Bona de Scorbuto.

elegant writer of Lord Anſon's voyage remarked, that when any event happened to diſcourage or to damp the ſeamen's hope of a ſafe return to their native country, the weak and the languid were laid up, and the deaths of thoſe were haſtened who had already been confined. In the mild climate of the coaſt of Mexico, when the ſtrength of the ſmall remaining crew of Lord Anſon's ſquadron had been exhauſted by continual labour at the pumps in bad weather, the grief occaſioned by the diſmal proſpect of a long and dangerous voyage to be performed in leaky and ſhattered ſhips, probably operated powerfully to renew their misfortune. This ſeems to be a juſt and a natural way of accounting for the appearance again of the diſeaſe in a mild climate, when the men were furniſhed with plenty of water and freſh proviſions; a circumſtance which has been matter of great difficulty to explain upon any of our ſyſtems. Nor has it been attempted to be removed by any other means, than by ſaying, that ſailors having once ſuffered from the ſcurvy, are more ſuſceptible of its impreſſions a ſecond time. This however (admitting it to be true) is only aſſigning a reaſon why the effect is produced ſo eaſily, and does not at all account for the exiſtence of the cauſe. The ſolution I have given ſeems to be countenanced by every analogous view of the ſubject. Vander Mye preſents us with a curious and diverſified account of the effect of the paſſions of the mind in the ſcurvy during the famous ſiege of Breda. Upon the report of bad news it always ſpread aſtoniſhingly: but it was in a manner altogether checked by the arrival of agreeable intelligence.

CHAP. III.

Of the Prevention of the Scurvy.

THIS diſeaſe being the joint effect of its remote cauſes, the means to prevent it will conſiſt either in counteracting the impreſſion of each of its prediſpoſing cauſes ſingly, or, if that cannot be accompliſhed, in hindering the application of the exciting cauſes to perſons under their influence. Hence it is clear, that the methods of prevention muſt be as various as the circumſtances which prediſpoſe to it, or the cauſes which excite it. To guard the convaleſcent, or to ſecure a relaxed conſtitution, we muſt reſtore the ſtrength of the former, and brace the weak fibre of the latter. In theſe ſituations, the bark, the chalybeate medicines, the bitter drugs, the elixir of vitriol, have been judiciouſly and ſucceſsfully adminiſtered. In theſe caſes, too, gentle exerciſe promiſes great ſervice; for this purpoſe, on board ſhip, it has been found beneficial to put convaleſcents into a ſling below the forecaſtle, or between decks; from which mode of agitation they are obſerved to recruit both their ſtrength and their ſpirits. It is of conſequence that officers ſhould indulge ſuch valetudinarians, and that they ſhould not be recalled to their duty before their health is perfectly re-eſtabliſhed.

As we are to avail ourſelves, among other things, of exerciſe, to reſtore the ſtrength of the convaleſcent; ſo is the health, which is not impaired, to be preſerved by the ſame means from the prediſpoſing effects of indolence. The cuſtom therefore of ſome captains of men of war in the Dutch ſervice, in ordering their men frequently to looſe and to unfurl the ſails, ſeems to have been very juſtly commended, as they unite thereby a care of their health to their improvement in ſeamanſhip. But, if indolence is to be avoided, as a means of enervating the body, ſo is it of equal moment to guard againſt fatigue, as tending to deſtroy its force. This great calamity of the ſcurvy, ſays the phyſician to the Ruſſian army, whom I quoted before, was greatly prevented by ſending the recruits much earlier, ſo that they had ſufficient time to be refreſhed after their journey, and to be accuſtomed to the military life and diet, before they marched; as alſo by every regiment being provided with a certain number of covered waggons for their ſick, in which they were at all times ſheltered from rain, duſt, wind, and weather. The happy effect of theſe regulations was, that in an whole diviſion, conſiſting of ten or twelve regiments, they had ſcarcely as many ſcorbutic caſes as had occurred in the former campaign in one regiment only, and of theſe an incredibly leſs number died.

It is almoſt needleſs to uſe any argument to evince the neceſſity, or to point out the advantage of guarding againſt cold and moiſture; which, as well as the fatigue of the men, were in ſome degree attended to in the Ruſſian army. But there is nothing which will impreſs us with an higher idea of its importance, than the condition of the different parts of the crews of our men of war during the prevalence of the ſcurvy. The channel fleet has often buried an hundred men in a cruize, and landed a thouſand more afflicted with the ſcurvy, and yet among the number there has not been a petty officer. How does the condition of the petty officer differ from that of the common ſailor? The one as well as the other is obliged to live on the ſhip's proviſions. The only difference is, that the petty officers ſleep in cloſe berths, as they are called, with canvas hung round, by which they are ſheltered from the inclemencies of the weather *. Beſides the advantage of warm cabins, they are more warmly clad, and, having a greater plenty of cloaths to ſhift, they are leſs liable to continue wet, or to be ſo unclean as the common men. The officer thus is ſeldom attacked with the ſcurvy, unleſs during its moſt violent rage, and when the ſailors have been previouſly almoſt deſtroyed; at which time, they being themſelves reduced to undergo the duties, hardſhips, and inconveniences of common men, they are expoſed to the ſame conſequences. Captain Cook ſeems to have been the firſt officer who has paid a proper attention to theſe rules, or at leaſt the firſt who has been ſo thoroughly penetrated with a ſenſe of their importance, as to have ſtudied ſcrupulouſly to carry them into execution. He was careful to guard againſt the too great fatigue of

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* Vide Dr. Lind.

his men, and to ſecure them as much as poſſible from the effects of cold and moiſture. In the firſt place, he put them to three watches inſtead of two, (except upon ſome extraordinary occaſions) by which means, they had eight hours reſt for four of duty, and did not get the broken ſleep which men in their ſituations have generally done. They had thus time to recruit their ſtrength before they were ſummoned to return to their labour, and they were likewiſe thus leſs expoſed to the weather, than if they had been at watch and watch. If the men got wet, they had generally dry cloaths provided to ſhift themſelves. Proper methods were taken to keep their perſons, hammocks, cloaths, &c. conſtantly clean and dry, and equal pains were devoted to keep the ſhip clean and dry between decks. The hammocks and bedding, every day that was fair, were not only ordered upon deck, but each bundle was unlaſhed, and ſo ſpread out, that every part might be expoſed to the air. Beſides the ordinary methods of waſhing and ſcraping the decks, Captain Cook had ſome wood put into a proper ſtove, kindled, and carried ſucceſſively to every part below deck; which not only contributed to dry the ſhip, but, by heating the impure air below, and rendering it ſpecifically lighter than the common air, to make it to riſe, and to paſs through the hatchways into the atmoſphere *. In the torrid zone, he ſhaded his people from the ſcorching ſun, by an awning over his deck. In his courſe under the antarctic circle, he had a coat provided of a ſubſtantial woollen ſtuff, with the addition of an hood to cover their heads. This garb (which the ſailors called their Magellan jackets) they occaſionally wore, and found it a moſt comfortable one for working in rain and ſnow,

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* See Sir John Pringle's ingenious explanation of this proceſs, in his elegant diſcourſe delivered before the Royal Society, upon giving the prize medal to Captain Cook.

and amidſt the broken ice, in the high latitudes of the South. The Ruſſian boor ſeems to be greatly indebted to ſimilar means for his preſervation from the ſcurvy; for, though he lives in an extremely cold climate, eats a good deal of ſalted meats, has no freſh vegetables for ſix months of the year, and breathes during that time the foul impure air of an unventilated apartment; yet, cloathing himſelf in warm flannels, covering himſelf at night with warm ſheep-ſkins, providing for his cleanlineſs by the regular uſe of the warm bath, he is ſeldom afflicted with this calamity.

Having remarked, that a melancholy ſorrowful ſtate of mind has been known to render people very ſuſceptible of the ſcurvy; it is to be preſumed, that the oppoſite affections of gaiety and chearfulneſs will prove good preſervatives againſt it. Officers, both in fleets and armies, have with this view found it beneficial, not only to permit, but to encourage their men

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in amuſements of various kinds. During the famous ſiege of Breda, the holding out hopes of effectual relief was attended with good conſequences to thoſe who were ill, and prevented others from being attacked, who ſeemed inclined to the diſeaſe. We have moreover the teſtimony of the elegant writer of Lord Anſon's Voyage, that "alacrity of mind, and ſanguine thoughts, are no contemptible preſervatives againſt the fatal malignity of this malady."

All our reſources to prevent this diſeaſe, are not derived from the various means of correcting its prediſpoſing cauſes only. Where we find it impoſſible entirely to efface the impreſſion of theſe, it will be adviſeable for perſons under their influence to be extremely cautious in their diet, and to avoid the application of its occaſional cauſes. Captain Cook would not ſuffer the fat which is boiled out of the ſalt beef and pork, to be given to his men, as is cuſtomary. It did not eſcape that ſagacious officer's notice, that ſuch groſs indigeſtible matters had a great tendency to excite the ſcurvy. In Hungary, they who did not make uſe of a heavy tenacious ſort of pudding, were not afflicted with it. In Greenland, and in Lapland, we have ſeen, a food of eaſy digeſtion, without any vegetables, has afforded the moſt perfect ſecurity under the ſtrongeſt prediſpoſition to the complaint.

But if the prediſpoſing cauſes cannot be remedied, nor any other than a hard indigeſtible diet be procured, we ſhould apply ourſelves to the correction of thoſe qualities of it by which it is pernicious. Let us uſe every means in our power to promote the ſolution of that food in the ſtomach, which by its hardneſs proves prejudicial. This was the wiſe conduct of Capt. Cook. He took care at all times to provide a plenty of freſh water for his men. Should other officers not be ſo lucky in opportunities of ſupplying themſelves with it, as he was, the mode of ſweetening ſalt-water, by diſtillation, preſents them with the means of mitigating, if not of totally remedying their misfortune. If the taſte of ſuch water ſhould not be agreeable, it may be rendered palatable by the acid juices, the robs of lemon, oranges, &c. or, which is perhaps ſtill better, by fixed air *, ſince the benefits of this, which is to be procured in all ſituations, and in any quantities, may be extended to ever ſo conſiderable a claſs of men; and its active ſtimulant properties are not only well ſuited in themſelves to obviate the cauſes of this diſeaſe, but, by giving a lively acidulous taſte to liquors, are well

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* It ſeems to be regretted, that Captain Cook ſhould not have made uſe of the method of impregnating water with fixed air, deſcribed by Doctor Prieſtley, and expreſsly recommended for trial by the Board of Admiralty, after having been approved by the College of Phyſicians, to whom, by the direction of the Board, Doctor Prieſtley had ſhewn the proceſs, and who, as the learned Doctor informs me, agreed in opinion, that water ſo impregnated, promiſed to be of great uſe in preventing and curing the ſcurvy.

calculated to recommend the uſe of ſuch as might otherwiſe be vapid and diſagreeable. Nothing can ſet the propriety of attempting to diſarm the occaſional cauſes by a plenty of drinks in a ſtronger light, than the general obſervation of mariners, that a ſhip's crew ſeldom ſuffer much from the ſcurvy, till they have been reduced to a ſhort allowance of ſmall-beer * and water.

From what has been premiſed, then, it appears, that the means of preventing this diſeaſe muſt vary with the difference of ſituations and circumſtances; and that to aim at any univerſal rule of oppoſing its invaſion, is equally abſurd and empirical. The Bark, Steel medicines, &c. are well

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* The infuſion of malt, recommended by Dr. Macbride, muſt ſurely be a good ſubſtitute for the ſmall-beer; or, in the view I have mentioned, a good aſſiſtant with it, to prevent the ſcurvy. The character Dr. Lind gives it, ſeems to be a very juſt one, "that it is a very nouriſhing liquor, well adapted for ſcorbutic patients."

calculated to guard one juſt recovered from an acute diſeaſe, or to brace and to protect a relaxed phlegmatic conſtitution: but in the cold regions of Ruſſia, ſuch medicines would be poor ſubſtitutes for warm baths and flannel cloaths: and on the other hand, theſe, which are of ſo much benefit to the Ruſſian, would ſerve only to increaſe the weakneſs, and to haſten the approach of the diſorder to the infirm valetudinarian. By an attention to cleanlineſs, by guarding againſt fatigue, &c. by providing at all times a plenty of freſh water, Captain Cook's ſeamen lived with impunity on their ſalt proviſions. In the very northern regions, in Greenland and in Lapland, notwithſtanding the prediſpoſing cold of thoſe climates, a diet of eaſy digeſtion, without the aid of any vegetable ſubſtance whatever, has afforded equal ſafety.

It has ariſen entirely from a neglect of theſe diſtinctions, that our endeavours to prevent the ſcurvy have generally been fruſtrated. Our views have conſtantly been directed to remedies for this complaint, which in ſome ſituations are difficult to procure, and for the moſt part but imperfectly attained: whilſt employed in the ſearch of a cure, we have neglected the means of prevention, which are often within our reach, and eaſily applied. Every officer may divide his crew into three companies, inſtead of two, (unleſs, perhaps, upon ſome extraordinary occaſions.) By thus giving every man eight hours reſt, inſtead of four, he may prevent his men from being exhauſted by labour, or a want of ſleep. Cleanlineſs may be ſupported by diſcipline. Cloaths may be procured to guard againſt cold, and the effects of moiſture. Water may be for the moſt part provided. The conſideration of the cauſes of this diſeaſe, would not only have taught us the utility, but would have ſhewn the indiſpenſable neceſſity of attending to theſe objects to obtain an exemption from it. But we have been led by deluſive theories to repreſent other things of leſs moment, as matters of much greater conſequence. Though the fatal experience of the Spaniards, more than a century ago, in the ineffectual exhibition of marmalades of various fruits, ſhould have inſtructed us how little reliance is to be placed on matters of that ſort, yet a greater ſtreſs has been laid, even in this age, on the due making, and on the right adminiſtration of the robs of lemons, oranges *, &c. than on

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* Captain Cook makes very little account of theſe preparations. They were tried, and they failed. The infuſion of malt did what they could not perform. Sir J. Pringle wrote to Captain Cook, at Plymouth, juſt before he ſailed upon another voyage, wiſhing him to reconſider this part of his narrative: but, grounded upon experience, he ſtill adhered to his firſt opinion. Sir J. Pringle, however, though he beſtows the higheſt encomiums upon Captain Cook's narrative, as an inconteſted relation of the means by which he preſerved his men from the ſcurvy, and as containing "neither the vain boaſtings of the empiric, nor the ingenious and *deluſive* theories of the dogmatiſt," cannot give up the inſpiſſated

on the meaſures which have been mentioned. Sailors ſeem to have been taught to rely too much upon us, and too little upon themſelves, and to expect that ſecurity from medicines—from ſpecific antidotes—which is only to be derived from their own conduct and good management. The high authority of Captain Cook's name and example would, I ſhould hope, reform this mode of proceeding. His narrative is very deciſive upon theſe points. He aſſures us, " that the introduction of the moſt ſalutary articles, either as proviſions or medicines, will generally prove unſucceſsful, unleſs

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inſpiſſated juices: but ſeeks to account for their failure. They were not, he ſays, given in ſufficient quantity; and yet it is particularly ſtated, that they were given in the doſe ſpecified to the ſurgeon, before he left England, and with ſo little advantage, that recourſe was obliged to be had to other things. Sir John ſeems to have thought that they muſt neceſſarily be efficacious, becauſe they were claſſed among the antiſeptics: but this ſurely is ſupporting ſpeculative theory againſt poſitive experience.

ſupported by certain rules of living," which are ſuch, for the moſt part, as have been ſuggeſted; and that, with an obſervance of thoſe rules, "with plenty of water, and an attention to cleanlineſs, a ſhip's company will ſeldom be much afflicted with the ſcurvy, though they ſhould not be provided with any of the various anti-ſcorbutics, as they are termed, with which he was ſupplied."

CHAP. IV.

Of certain Opinions which have been maintained with reſpect to the Proximate Cauſe of the Scurvy.

WE are now to conſider what the joint effect of theſe remote cauſes will be, if our endeavours to prevent their co-operation ſhould prove unſucceſsful; that is, in fact, what is the eſſential nature of the ſcurvy; or, to ſpeak in medical language, what is the proximate cauſe of its ſymptoms? In the ſtate of organic weakneſs, or general debility, derived from the predispoſing cauſes, it was the idea of Boerhaave, that any food received into the ſtomach, and being no longer affected, or but weakly acted upon, by the digeſtive powers of the body, would follow its own nature — That aceſcent ſubſtances would become acid—that alkaleſcent ſubſtances would become alkaline—and that neutral ones would remain unchanged—That from hence the ſpecies of the ſcurvy would be as various as the different nature of the matters producing it—That one ſcurvy would conſiſt in an acid, another in an alkaline, and a third in a neutral or muriatic acrimony of the juices. But theſe are rather plauſible inferences, than well-founded ideas. It is, I believe, agreed among phyſicians, that there is but one ſpecies of this diſeaſe. The difference even between the land and the ſea ſcurvy, is to be found in books, not in nature. In the Ruſſian camp near Azoph, in the Imperial army in Hungary, and among our ſeamen in the Britiſh channel, the diſeaſe has aſſumed the ſame character, and exhibited the ſame features. No eſſential marks of diſtinction, at leaſt, have been obſerved. Boerhaave's doctrine of acrimony having been ably refuted by others, I ſhall not enter into it; but ſhall content myſelf with obſerving only, that Dr. Lind taſted the ſerum of the blood of perſons in the ſcurvy, and found it made as little perceptible impreſſion on the tongue as the white of an egg.

Another learned gentleman *, to whom the medical world is under infinite obligations, teaches us, that (excepting where it may be occaſioned by a moiſt or putrid air, or a want of exerciſe or vegetables) the ſcurvy ariſes ſolely from a ſalt diet—that ſalted meats become in effect putrid, though they may continue long palatable by means of the ſalt they contain — that the mixture of the putrid juices of this food, with the maſs of our circulating fluids, produces the ſcurvy; the proximate cauſe of which is ſaid to conſiſt in "a gradually accumulated putrefaction."

It is matter of concern to me, to diſſent from the learned author of theſe opinions,

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* Sir J. Pringle.

and painful to me to have occaſion to remark, that he does not appear to have formed a perfectly juſt eſtimate of the nature of the cauſes of this diſeaſe. It cannot but be remembered, that a great part of the food, even of a ſailor (to ſay nothing of thoſe inſtances where the ſcurvy has ariſen during the uſe of freſh vegetables *) poſſeſſes properties oppoſite to putrefaction — that a great part of it is of the farinaceous kind, and of an aceſcent nature; as the biſcuit, the pearl-barley, the rice, the peas, the beans, ground oats made into burgow or water-gruel, &c. Actual experiments ſhew that theſe ſubſtances, reduced to flour, moiſtened, mixed with ſaliva and water, and placed in an heat equal to that of the human ſtomach, actually fer-

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* See Dr. Lind. Others likewiſe have recorded inſtances of the ſame kind. Dr. D. Monro relates the hiſtory of a ſcorbutic caſe, which aroſe during the daily uſe of vegetables. See the Medical Tranſactions of the College.

ment and produce an acid. It is not then in the mechanical admixture of ſuch matters with our juices, that we can look for the ſource of a putrid contamination of our fluids. But it may perhaps be urged, that the tendency and nature of thoſe aceſcent ſubſtances are more than counteracted by the ſalt beef, the bacon, &c. " Theſe," it is ſaid, " are in effect putrid." As the learned author of this idea frequently makes experiments on ſubſtances out of the body the criteria, by which he judges of the properties they will exert within it, though I cannot but think ſuch a mode of proceeding liable to exception, I have no objection to appeal to ſuch teſts upon the preſent ſubject.

If we ſhould conſult ſuch experiments, and admit their concluſions, we ſhould find reaſon to reverſe this propoſition, and to aſſert, that the noxious tendency of the ſalt-diet of ſailors is corrected by the aceſcent ingredients of their food. Dr. Monchy, making uſe of the various articles of the ſeaman's fare, imitated the experiments with freſh meats by Sir John Pringle. With the various ſubſtances, dreſſed in the ſame manner, and in the like proportion as they are iſſued on board men of war, he mixed a certain quantity of human ſaliva. Theſe mixtures he placed, during twelve or twenty-four hours, in a place, the heat of which was equal to that of the human ſtomach. By a cloſe attention to the different changes and appearances through which they paſſed, he obſerved, firſt, that animal ſubſtances, as fleſh, fiſh, and bacon, being mixed with thoſe of the farinaceous kind, contract a tendency to putrefaction.

2dly. That by this tendency to putrefaction, they are capable of exciting a fermentation in unleavened farinaceous ſubſtances.

3dly. That this fermentation will be produced by uſing farinaceous ſubſtances only; but in a much more ſlow and languid degree than from the commixture of animal food or ſubſtances.

4thly. That the pouring water, beer, or vinegar, on thoſe mixtures, produces little or no difference in the fermentations.

5thly. That the fermentation ariſing from the mixture of farinaceous with animal ſubſtances, is productive of a ſtrong acid, which oppoſes and totally prevents all further putrefaction *.

6thly. That ſaliva, added to ſuch mixtures, retards the putrefaction of animal ſubſtances, abates the fermentation of fari-

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* This is ſimilar to the reſult of an experiment of Sir J. Pringle's. Bread being mixed with ſheep's gall, when the latter, after a few days, began to putrefy, it was corrected by the former; and on the ſixth day it ſeemed to be as uncorrupted as on the firſt.—Vide Exper. 28. of Sir J. Pringle.

naceous ones, and obtunds the points of the remaining acid.

So far then is the putrid or putreſcent part of a ſailor's food on board ſhip from counteracting or deſtroying the effect of the aceſcent ingredients of his diet, if ſuch ſort of experiments be to guide us, we ſhould ſay, the contrary actually happens. A ſtrong acid reſults from their fermentation, and predominates ſo as to act as a powerful antiſeptic. But do ſalted proviſions corrupt ſo quickly as they have been repreſented to do? Do they become putrid, and remain palatable only by means of the ſalt they contain? If that be the caſe, we muſt, with Arbuthnot, either aſcribe a power to the ſtomach, not only of deſtroying the ſpecific difference of every thing, but of converting even a putrid ſubſtance into wholeſome nouriſhment; or, we muſt admit, that the aceſcent ingredients of a ſailor's diet actually do render the ſalted proviſions not only harmleſs, but nutritious. For Dr.

Lind aſſures us, that he has known meſſes, as they are called, of ſeamen, who have lived, during a voyage of three years, on the ſhip's proviſions, for want of money to purchaſe better fare, eſpecially greens, and yet have preſerved their health. But ſuppoſing theſe ſalted meats to be as putrid as they have been repreſented, (which, I profeſs, I am far from thinking true) the argument will apply only to perſons who living upon ſuch food have fallen into the ſcurvy. It will not affect the caſes of thoſe at all, who have made uſe of no ſalted proviſions, and yet have been ſeverely afflicted with the diſeaſe. I have adduced the moſt reſpectable and undiſputed teſtimony, that the Ruſſians, who ſuffered extremely from the complaint, had no ſalted proviſions whatever. The Imperial army in Hungary had freſh beef remarkably good and cheap. Had the moiſt impure air, or any ſuppoſed qualities in the water or liquor they drank, been the ſource of the diſeaſe, all thoſe who from preceding illneſſes, or other cauſes, had been prediſpoſed to it, ſhould have ſuffered equally. But the Bohemians chiefly were the people who were attacked with the ſcurvy; and they were the perſons who lived on an indigeſtible farinaceous pudding, called "Rollatſchen." It is particularly ſtated, that when the ſcurvy invaded Lord Anſon's crew on the coaſt of Mexico, they had plenty of freſh proviſions and good water. The little ſuſtenance of the poor people who were attacked by it in Italy, was of a vegetable and aceſcent nature.—The mechanical admixture of putrid juices, ariſing from food, cannot then be admitted to be a general ſource of the ſcurvy.

Let us for a moment wave all arguments *à priori*, and examine what proofs can be alledged of a putrefaction being actually and gradually accumulated in the blood of ſcorbutic perſons, however it may be produced, from whatever ſources it may ariſe. If putridity actually took place in the vital fluid, its firſt effects would be to break down the texture of its parts, as it does that of every other body; it muſt render it incapable of coagulation. We are ſtill much in the dark with reſpect to the circumſtances in general which influence the coagulation of the blood. But though we know that the parts of ſome blood, which is not putrid, is often very little diſpoſed to coagulate and to concrete, yet we are certain that that blood which is putrid never can coagulate *. So far, however, is the blood of perſons in the ſcurvy from not coagulating, that in the extreme degree of the diſeaſe, they who died of it ſuddenly, had the auricles of their hearts enlarged to the ſize of the fiſt, and replete with *coagulated* blood. So firm was the coagulation of the blood poured into the cellular texture between the muſcles, that it gave them an hardneſs reſembling that of wood *. Dr. Lind bled, at different times, an hundred ſcorbutic patients, and found generally a perfect ſeparation of the water and ſerum from the red concreted maſs. The latter, in the laſt ſtage of the diſeaſe, was firm and compact, and often covered with ſtreaks of what is commonly called gluten, or ſize of the blood. Dr. Rouppe likewiſe confirms the obſervation of the coagulation of the blood in the laſt ſtage of the diſeaſe, and adds, that the coagulum was then greater even than in the firſt ſtage. Relying, therefore, on this criterion of its coagulation, a criterion which Haller himſelf admits, I am warranted to conclude, that the blood of ſcorbutic perſons is not in a putrid ſtate. I have entered more particularly into the refutation of this idea, becauſe the notion

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* Putredo omnia vincula partium animalium rumpit, humores alioquin coagulabiles, cruorem, lympham, ovi albumen, amnii liquamen in acre et nullo porro veneno coagulabile tabum reſolvit, &c. Vide Alberti Halleri de partium corporis humâni præcipuarum fabricâ et functionibus opus. Tom. iii. p. 137.

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* See Poupart.

has been no leſs popular than groundleſs; and no leſs pernicious in its tendency than extenſive in its prevalence.

It is confeſſed by ſome perſons, that the blood cannot, indeed, be expected to be in an actually putrid ſtate; but that it is the ſtrong diſpoſition of the vital fluid to putridity, which conſtitutes the proximate cauſe of putrid diſeaſes. This aſſertion ſeems to me to confound all propriety of language, and every rule of common ſenſe. It is to ſay, that an inclination in the fluids to putridity, is the proximate cauſe of actually putrid affections. The propenſity to any particular ſtate muſt ſurely be ſhort of the ſtate to which it tends, and incapable of giving that which it has not itſelf attained. The eſſential nature of a diſeaſe muſt be conſtituted by ſomething abſolute; nor is it to be ſought for in any future poſſible or probable condition of the body. But though an inclination to putridity cannot therefore be conſidered as the proximate cauſe of a cor-

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ruption already exiſting; let us, however, as a matter of curioſity, enquire whether ſuch a proneneſs to putridity really takes place in the caſe before us or not. If it ſhould be ſaid, that the blood of ſcorbutic people is not, indeed, in a putrid ſtate, but in a condition nearly approaching it, what is the anſwer which might be returned? On the authority of experiments, Dr. Lind aſſures us, that the blood of ſuch perſons, kept in the ſame ſtate of the air, did not corrupt ſooner than that of healthy people. Thin ſlices of mutton, ſteeped in its ſerum, continued ſweet, and free from taint, as long as in the ſerum of blood drawn from perſons in health. The ſecretions from the blood confirm the ſame idea; for he did not find the urine of people in the ſcurvy to be more offenſive than the urine of perſons in health.—Whether I conſider, therefore, the nature of the cauſes producing the ſcurvy, or the actual ſtate of the blood in the diſeaſe, or the ſecretions from it in the courſe of the complaint, they all concur to make me believe, that this diſeaſe does not conſiſt in a putridity of the blood. Nor does there appear to be any quality, which can be diſcerned and defined, in the blood of ſcorbutic perſons, by which the particular nature of their diſeaſe can be characteriſed.

CHAP. V.

Of certain Properties of the muſcular Fibres of the Body.

It being my purpoſe to examine into the changes produced in the ſolids, by the remote cauſes of diſorders termed putrid, it may not be improper, firſt, to give an account of the ſtate and condition of them in health, that we may the better be enabled to judge of the injuries they may ſuſtain, and the alteration they may undergo from diſeaſe.

Though the manner in which the various motions of the body are executed, as well as the more intimate ſtructure of its fibres, may be for ever concealed from us; yet there are certain properties of theſe taught us by experiment, the exiſtence and true uſe of which are as well aſcertained as any part of human knowledge. That property of the muſcular fibre, by which, on the application of a ſtimulus, it is enabled to move and to contract itſelf, is known to be derived from a principle inherent in the fibre, and, to a certain degree, independent even of life. For, though the deſtruction of this principle in the animal ſyſtem is certain and immediate death, yet there are many cauſes which may take away life, and may leave this principle ſurviving in the muſcular fibre; ſo that when all motion in the machine has ceaſed, and internal ſtimuli can be no longer applied, we can, for ſeveral days, by external ſtimuli, excite the muſcular fibres to contraction, in conſequence of this principle not being yet extinct in them.

But though this property does not always end immediately with life, it begins with it; and it has therefore been called the vital power * (a name which I ſhall continue to uſe) and the muſcular fibre endowed with it has been termed the moving fibre. The voluntary and involuntary motions of the body are all dependent upon this principle. It is in conſequence of it, that the muſcular fibres of the heart, being ſtimulated by the blood flowing into its auricles and ventricles, are made to contract and to propel the blood. The ſame vital power in the voluntary muſcles, being acted upon by the nervous fluid (whatever the nature of this may be) directed to them by the will, renders them obedient to its purpoſes. The vital power is the efficient cauſe, whilſt the ſtimuli applied (as for example, the blood flowing into

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* Gaubius calls this principle "the vis vitalis," Haller, "the vis inſita muſculi," from its being an inherent property of the muſcular fibre. Haller ſometimes denominates this property, "the natura irritabilis muſculi, irritabilitas muſculi."

the cavities of the heart, in the firſt inſtance, and the nervous fluid in the ſecond) are only the exciting cauſes of muſcular motion : for, where the vital power is deſtroyed, no motion can be excited in the muſcular fibre, by any ſtimulus whatever *.

To treat of the connection of this principle with the vigour and ſtrength of the body, would be to digreſs too much from the particular ſubject of theſe pages. To explain the effects of an increaſed or undue action of it, would lead to the conſideration of that increaſed tone and contractility of the

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* Non vi è piu trai Filoſofi, chi ignori che l'irritabilita della fibra è la ſorgente, è il principio del moto e della vita, e che a queſto principio ſolo ſi devono riportare tutti i movimenti ſi voluntari, che involuntari dell' animale. Se queſto principio manca, tutto è morto allora nell' animale, e fino è tolta la poſſibilita alla fibra di più contrarſi. See page 188 of the "Recerche Filoſofiche ſopra la Fiſica Animale di Felicie Fontana."

the fibres which takes place in inflammation *. The diſeaſes of which it is my purpoſe to ſpeak, far from being occaſioned by an increaſed action of the vital power, will be found to be connected with the exactly oppoſite ſtate of it, with a diminution of the vital power. To the effects of this diminution of it, I ſhall therefore confine my preſent attention.

The celebrated philoſopher whom we have juſt now quoted, Fontana ‡, has examined

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* See Dr. Cullen's definition of Tone, in his Phyſiology, publiſhed by Dr. Gregory; and his account of the inflammatory diatheſis, in his Firſt Lines of the Practice of Phyſic. See the Compendium Medicinæ, by de Gorter, chap. 9. vol. 1. where he ſays, "Aliud genus roboris eſt, quod conſiſtit in majori contractilitate; ſi nempe contractio naturalis omnibus fibris major ſit quam in corpore ſano adeſſe debet."

‡ It may be proper in this place to lay before my readers the criterion by which Fontana would have us eſtimate the vital power of a fibre, as well as the cautions which he ſeems wiſely to recommend to our uſe in judging of it: — "Tutto queſto

mitted very attentively the effects of thoſe cauſes which have a power of impairing the vital principle, and, upon the grounds of extenſive

queſto mi ha indotto ad eſaminare di nuovo quello che era ſtato penſato ſopra le parti più e meno irritabili, ed a rifare nuove eſperienze ſopra di una materia che pareva già eſaurita da tanti oſſervatori. E ſe io non erro, mi e parſo alla fine che tutta queſta materia di parti piu e meno irritabili ſia piena di equivoci è di fallaci eſperienze. Non ſi è uſato quel giuſto criterio tanto neceſſario nel farle, ſi ſon confuſe le parti le piu irritabili con le piu irritate, ſi ſono chiamate meno irritabili quelle che ſi muovevano meno lungamente ſenza avere alcun riguardo alle accidentali circonſtanze. Quando ſi voglia eſaminare con rigore la forza dell' irritabilita di un muſculo, e trovare i veri rapporti come ſi fa di tutte le altre forze della macchina vivente, e calcolar queſta nuova forza della fibra animale come ſi calcolano le altre forze dei corpi, pare che ſi debba miſurare dagli effetti che ne ſeguono contratto il muſculo e dai peſi che puo innalzare. In queſto ſenſo che e il piu proprio e il piu naturale, ſara un muſculo piu irritabile d'un altro, ſe poſte le medeſime circonſtanze produrra un maggiore effetto è levera un più grand peſo."—It had been to be wiſhed, extenſive and judicious experiments, affirms it to be an univerſal law of the animal œconomy, that the diminution or deſtruction of the vital power in the muſcular fibre, gives it a tendency to putrefaction, and that this tendency will be greater or leſs in proportion to the force and quickneſs with which the cauſe deſtroying this principle operates. The poiſon of the viper acts upon this ſource

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that, inſtead of endeavouring to reform the ſenſe of the word "irritable," Fontana had changed the term. For people who have generally uſed it to expreſs a quickneſs or facility of contraction in the muſcular fibre, will with difficulty be brought to annex a different idea to it, however proper it may be. It might prevent confuſion, if, for the reaſons he aſſigns, he had ſaid, that in any given circumſtance, or with a given ſtimulus, the vital power of a fibre will be as the force of contraction produced. I ſhall give many practical inſtances, in the courſe of theſe pages, to evince the juſtneſs of this criterion. An attention to the ſtimuli concerned in producing the various motions of the body, will be ſhewn to be uſeful in enabling us to give a conſiſtent account of the convulſions particularly incident to weak people.

of motion in the muſcular fibre. The rattle-ſnake is often known to kill large animals in a minute. Thoſe which die in the ſhorteſt time, have always gangrenous appearances round the wound inflicted by the bite. The bodies of ſuch animals as ſurvive a longer period after being bit by the viper, turn black, and have every ſymptom of approaching mortification. Where the cauſe is leſs powerful in its operation, and we have time to note with accuracy all the phænomena which ſucceed the injury of the vital power, it is obſerved, that the firſt effect of the diminution of it, is a weakneſs of the muſcular fibre, ſo that ſtimuli, which could have excited it in health to ſtrong contractions, can in this impaired ſtate of its vital power only produce weak ones. A ſtrong ſhock of electricity *, by diminiſhing the

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* Haller mentions, likewiſe, theſe cauſes among the number of thoſe which deſtroy the irritability of the fibre. " Ita agit," ſays he, " ſulphuris vapor et nux vomica;

the vital principle, weakens the power of contraction in the muſcular fibre; and, if the force of the ſhock be increaſed, it will deſtroy the vital power entirely, and deprive the fibre of all faculty of motion. From being firſt weak, the fibre becomes ſoft and flaccid; and animals killed by ſuch means are found to be more tender in twenty-four hours, than when deprived of life by the ordinary means in ſeveral days. The muſcular fibres in theſe caſes are obſerved to be lengthened: the particles compoſing them touch one the other in fewer points, and the coheſion between them is ſoon deſtroyed ſo entirely, that the fibres break upon the leaſt touch, and putrefaction in a very ſhort period enſues.

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vomica; ita morſus viperæ; ita electrica vis auctior, qualis eſt in fulgure, et quæ facit ut cor irritatum nonniſi tremores aliquos cieat, &c.—Vide Alberti Halleri de Partium Corporis Humani præcipuarum Fabricâ et Functionibus Opus.—Tom. ii. p. 407.

I ſhall now enquire what are the changes produced in the ſolids by the cauſes of the ſcurvy, and by what evident and diſcriminating marks ſuch alterations are to be known. I ſhall examine whether the ſymptoms of the ſcurvy be ſuch as denote a diminution of the vital power—whether ſuch a weakneſs of the muſcular fibres, in conſequence of it, takes place, as to prevent ſtimuli, which in health were capable of exciting ſtrong contractions in the voluntary and involuntary muſcles, from being able to produce any other than feeble motions ? Is this weakneſs attended with the ſame conſequences, as in the experiments alluded to ? Does the muſcular fibre in the ſcurvy become ſoft and flaccid ? Does it lengthen ? Is the coheſion between the particles compoſing it diminiſhed, ſo that the fibre breaks upon the leaſt touch ? and does the putrefaction of the fibre regularly ſucceed theſe conditions of it ? The ſlow progreſs of the ſcurvy has afforded excellent occaſion for an accurate obſervation of its ſymptoms; and if the appearances which occur, and regularly ſucceed one the other in this diſeaſe, ſhould correſpond with the phenomena which have been mentioned, it will throw no ſmall light upon the ſource in the animal œconomy, and the ſeat of putrid affections in general.

CHAP. VI.

Of the Symptoms of the Scurvy, and the Author's Opinion of its proximate Cauſe, deduced from them.

BOERHAAVE's Aphoriſm (1151) contains a very juſt account of the ſymptoms of the ſcurvy in its two firſt ſtages, excepting only a ſingle omiſſion, which is ſupplied by his learned commentator. The picture he has drawn of the two laſt periods is crowded with many circumſtances which have no natural or neceſſary connection whatever with that complaint. All its real ſymptoms I ſhall attempt to explain; and I ſhall diſtinguiſh ſuch as do not properly belong to it. " When the ſcurvy attacks the Dutch, the Danes, the Swedes, the Britons,

&c. it is generally accompanied," ſays Boerhaave, "with the following appearances."

1ſt. "* An unuſual ſlothfulneſs, a torpor, an averſion to motion, a ſpontaneous laſſitude of the whole body, an heavineſs of the ſame; a pain in all the muſcles, ſuch as is felt from too great fatigue, eſpecially in the legs and loins; a very great difficulty in walking, eſpecially up and down hill; on waking in the morning, a ſenſe of fatigue and bruiſes in all the limbs and muſcles." Theſe, ſays the learned commentator, Van Swieten, are the ſymptoms of the firſt ſtage of the ſcurvy; which, if they be not cured, are followed by others, which will be ſucceſſively enumerated.

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* Pigritia inſolita, torpor, ſedendi et decumbendi amor. Laſſitudo ſpontanea toto corpore. Gravitas ejuſdem. Muſculorum omnium dolor quaſi a nimiâ fatigatione maximè in cruribus lumbiſque. Ambulandi imprimiſque per acclive et declive ſumma difficultas. Mane a ſomno evigilanti ſenſus omnium artuum et muſculorum quaſi fatigatorum et contuſorum.

There is not one of theſe ſymptoms which, by any fair or juſt interpretation, can be deemed to denote any thing but affections of the moving fibres. The ſluggiſhneſs, the torpor, &c. ſhew that the muſcular fibre is with more difficulty excited to contract, and that the vital power, upon which the contractions of all muſcles depend, muſt of courſe be impaired. The averſion to motion, the feebleneſs of the muſcles when brought into action; the inability of perſons ſo affected to ſupport themſelves in walking, which requires the aid and action of many muſcles, proves that that weakneſs has actually taken place, which is always attendant on a diminution of the vital power. This impaired ſtate of it is accompanied by ſome circumſtances, which may ſerve to diſtinguiſh it in this particular caſe. The laſſitude or ſenſe of fatigue incident to the ſcurvy, is different from that which occurs upon other occaſions. It is ſtated to be ſpontaneous, and in that reſpect differs from the laſſitude following labour, which is the neceſſary effect of an exceſs of exerciſe. The laſſitude incident to fevers, and attendant upon common colds, is ſuddenly brought on, and is generally diminiſhed after ſleep. But the laſſitude of the ſcorbutic comes on ſlowly, and increaſes gradually for days and weeks together. Sleep, which refreſhes others, affords no relief to the ſcorbutic perſon. In the morning when he riſes, he feels the ſame, and even an increaſe of that ſenſe of fatigue with which he laid himſelf down to reſt. Another ſymptom, omitted by Boerhaave, but mentioned by his commentator, is a ſmall, weak, unequal pulſe; a circumſtance ſo conſtant in this complaint, that many authors have conſidered it as its pathognomic ſign. In a more advanced period of the diſeaſe, ſo weak are the contractions of the heart and arteries, that the pulſe has well been ſaid by many old writers, reptare potius quam pulſare. We ſee then, that the ſtimuli, which in health uſed to excite ſtrong contractions in the fibres to which they are applied, can now produce only weak ones. Feebleneſs marks every motion in the muſcles ſubſervient to the will; and the blood flowing into the ventricles of the heart, (and more than ordinarily accumulated about it, as I ſhall hereafter prove) inſtead of occaſioning ſtrong and regular contractions, produces only a ſmall, weak, and an unequal pulſe. The exciting cauſes of the contractions of the fibres therefore continuing to act, and a leſs effect reſulting from their application, the efficient cauſe of them muſt neceſſarily be injured. The vital power, upon which the contractions of all muſcles depend, muſt be impaired. The torpor and weakneſs of the fibres in this caſe, put it beyond the poſſibility of a doubt. Theſe are the firſt and neceſſary effects of a diminution of the vital power. The gradual diminution of this principle, by the remote cauſes which have been related, ſeems therefore to conſtitute the proximate cauſe in the animal œconomy, from which the torpor, the weakneſs, and all the ſubſequent ſymptoms of the ſcurvy ariſe. I ſay, the diminution of the vital power by the remote cauſes which have been mentioned; for if the circumſtances of theſe varied in the ſlighteſt degree, the diminution of the vital power would be modified by that difference in them, and the effects and ſymptoms reſulting from it, would not be thoſe of the ſcurvy, but of another diſeaſe, different in its character, though related to it in many particulars, as will hereafter be ſhown. The juſtneſs of this obſervation may be ſeen in the effects of a want of ſufficient nouriſhment in different parts of the ſame country. In the neighbourhood of the Alps, which are covered with a perpetual ſnow, where cold concurred with a ſcarcity of proviſions, a ſcurvy was produced; but during a ſimilar famine in the mild climate of Naples, petechial fevers and dry gangrenes were the chief diſeaſes with which the poor inhabitants were afflicted.

The ſymptoms of the ſecond ſtage.

2d. * A difficult reſpiration, and almoſt a total loſs of it on the leaſt motion; a ſwelling of the legs, which goes and comes; the lower extremities become immoveable from their weight; ſpots of various colours, red, brown, &c. on different parts of the body: the gums ſwell; they are painful; they are hot, and have an itching ſenſation in them;

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* Difficilis, anheloſa, ad motus vel parvos fere deficiens reſpiratio: crurum tumor accedens recedenſque. horum præ gravitate immobilitas: maculæ rubræ, fuſcæ, violaceæ: faciei color pallido-fuſcus. Oris fætor incipiens. Gingivæ tumentes, dolentes, calidæ, prurientes, ad minimam preſſionem evomentes cruorem. Dentium ob retractas gingivas denudatio et mobilitas. Dolores varii vagi, per omnes externas internaſque corporis partes mira producentes tormina pleuritica, ſtomachica, iliaca, colica, nephritica, cyſtica, hepatica, lienaria, &c. Hæmorrhagiæ variæ ſed leviores.

they bleed on the leaſt touch: the teeth are left bare and become looſe, from the gums being puſhed back; various and vague pains in all the external and internal parts of the body, affecting all the different viſcera; many, but ſlight hæmorrhages.

It is well known, that when the muſcles are brought into frequent action by motion, the blood is accelerated to the right ventricle of the heart. With this acceleration, it is requiſite that the thorax ſhould be quickly and proportionably expanded, to tranſmit the blood through the pulmonary artery. Hæc eſt ratio, ſays Van Swieten, quare etiam in ſanis hominibus gradus rapidiſſimè adſcendentibus cor palpitare incipiat et reſpiratio fiat frequentior et moleſtior quia ſanguis venoſus tunc tantâ copiâ et celeritate redit ad cor dextrum a toto corpore ut non poſſit eodem tempore tranſire per pulmonem niſi celeri reſpiratione frequentius dilatetur pulmo. This being the caſe with perſons in health, it is no ways extraordinary, that on any motion of ſcorbutic people, the reſpiration ſhould become difficult, and that they ſhould almoſt loſe their breath; ſince, by the torpor in their muſcles, the cheſt and the lungs cannot be ſo eaſily or ſo readily dilated to make way for the tranſmiſſion of the blood. If this difficulty of reſpiration aroſe from any vice of the lungs, or any humour oppreſſing or irritating them, it would be attended with the ſymptoms uſually accompanying ſuch affections. But it is well obſerved by writers, that no circumſtances of that kind occur. The tuſſis, the ſibilus ſtertor, the dolor pungens, the orthopnœa, et his ſimilia thoracis affectibus propria, are not preſent. The abſence of them proves, that we have, in this caſe, referred the difficult reſpiration to its true cauſe.

"The ſwellings of the legs."—When the tone of the ſyſtem is diminiſhed, the propulſive powers of the heart and arteries will be, in a great degree, overcome by the gravity of the fluids; which will conſequently ſtagnate, and produce ſwellings in the extremities of the body. But when the effect of the gravity is removed, by an horizontal poſture, theſe ſwellings, as in the caſes of which we are ſpeaking, will diſappear.

" The lower extremities become immoveable from their weight."—The immoveableneſs of the lower extremities ſeems to ariſe from the diminution of the vital power in the muſcles; by which means theſe, which were before eaſily excited to contract by the nervous influence determined to them by the will, are now no longer capable of motion. The deſtruction too of that principle, which is uſually inherent in the muſcles, and which gives a ſpring and animation to all the fibres of the body, adds to them a ſeeming increaſe of weight.

" Spots of various colours, red, brown, &c.;

&c. : an offenſive breath : the gums ſwell, and are painful ; they are hot, and have an itching ſenſation in them ; they bleed on the leaſt touch ; they are left bare."

The diſcoloration and ſpots in various parts, have generally been aſcribed to the blood's paſſing in a putrid diſſolved ſtate into the cellular texture under the ſkin. But, that we have been ſomewhat miſtaken in our account of this matter, ſeems pretty evident, from the old obſervation of Poupart. In the bodies of perſons who died of this malady, and whoſe arms, legs, and thighs were tinged with a dark colour, almoſt black, he found a black coagulated blood under the ſkin. The contraction in the laſt ſtage of this diſeaſe, (contractura) he informs us, aroſe from the blood poured out between the interſtices of the muſcles, and which coagulated ſo firmly as to give them an uncommon degree of hardneſs. If the blood had been effuſed in a putrid diſſolved ſtate, it would not probably have been confined to a particular part, nor would the place it occupied have been circumſcribed. The impure corrupt fluid would have corroded every thing around it; it would have deſcended to the moſt depending part: it could not have coagulated, nor could it have produced an hardneſs or contraction. But that the effuſion, diſcoloration, ſpots, &c. ariſe from the remarkable tenderneſs, "teneritudo fibrarum," which obtains in conſequence of the diminution of the vital power, is proved by many obſervations. Such is the tender ſtate of the muſcular fibre in every part of the body, that a touch in any degree rough will break it, and, producing a ſolutio continui, will permit the veſſel to pour out its liquid contents. The weight of the fluids themſelves is often ſufficient for this effect; and thence ariſe thoſe frequent, and, in a more advanced period of the complaint, thoſe fatal hæmorrhages. This tenderneſs,

derneſs, this diminiſhed coheſion between the particles compoſing the fibres, is conſpicuous in the gums. Theſe firſt ſwell; they become lax, flaccid; their attachments to the teeth are eaſily broken. Hence the gums are puſhed back, and the teeth are left bare. The maſtication of hard ſubſtances is particularly apt to break the fibres of the gums; which, being in thoſe parts much expoſed to the air, corrupt and taint the breath. But though this teneritudo fibrarum is particularly conſpicuous in the gums, it is not confined to them. It is likewiſe diſcernible in other parts of the body. Van Swieten relates, that, having handled the wriſt of a ſcorbutic perſon rather roughly, to feel his pulſe, he found the traces of his fingers, the next day, in the diſcoloration of the ſkin.

"Various and vague pains in all the parts of the body, affecting the different viſcera." —The heart and arteries being ſo weakened as to be ſcarcely able to propel the fluids, theſe will diſtend the veſſels, and produce pains. Hence it ariſes, that theſe pains are moſt troubleſome and acute in thoſe parts, in the abdominal viſcera, where the circulation has the leaſt aſſiſtance from the action of muſcles. The juſtneſs of this account is confirmed by the circumſtance of the ceſſation of the pains, when, from the progreſs of the diſeaſe, ſuch a tenderneſs and diminiſhed coheſion in the fibres is produced, as to admit eaſily of a ſolutio continui in the veſſels, and of an effuſion of the contained diſtending fluids. It has been a general obſervation, that the pains are always alleviated upon the appearance of the ſpots.

The ſymptoms of the third and fourth ſtages.

"* A cadaverous putridity of the gums; an inflammation and hæmorrhage from the ſame;

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3. * Gingivarum putredo fœtens cadaver, harum inflammatio ſanguinem ſtillans, gangræna, Dentium vacillatio. Flavedo. Nigritudo. Caries. Varicoſi annuli ad raninas

ſame; a gangrene; looſe teeth; a ſallow dark complexion; caries; varices, or a deſtruction of the texture of the venæ raninæ; hæmorrhages, and thoſe often fatal, from

raninas venas. Hæmorrhagiæ ſæpe lethales ex ipſâ cute externâ, non apparente vulnere—ex labiis, gingivis, ore, naribus, pulmonibus, ſtomacho, hepate, liene, pancreate, inteſtinis, utero, renibus, &c. Ulcera peſſima, obſtinata nulli applicato cedentia, facile gangrenoſa, ubique, maxime in cruribus vagantia cum diuturno fætore. Scabies. Cruſtæ, ſicca et lenis elephantiaſis. Sanguis è venis eductus in fibroſâ parte ater, grumoſus, craſſus et tamen ſolutus. In parte ſeroſâ ſalſus, acer, muco flavo viridi in ſuperficie ſcatens. Dolores ſummi erodentes, lancinantes, citò trajicientes, noctu, ingraveſcentes per omnes artus, juncturas, oſſa, viſcera; maculæ lividæ.

4. Febres variæ, calidæ, malignæ intermittentes omni modo. vagæ. periodicæ, continuæ ατϱοφιαν inducentes. Vomitus. diarrheæ, dyſenteriæ. ſtranguriæ ſævæ, lipothymiæ. Anxietates ſæpe ſubito lethales. hydrops. tabes. convulſio. tremor paralyſis. contractura. maculæ nigræ. vomitus et ſeceſſus ſanguinis, hepatis, lienis, pancreatis, meſeræi putredo et conſumptio, contagium celere.

the ſkin on the ſurface of the body, without any appearance of a wound; the ſame likewiſe from various other parts, from the lips, the gums, the lungs, the ſtomach, &c.; ill-conditioned obſtinate ulcers, not to be cured by any application, and having a great diſpoſition every where to gangrene; the itch; ſcabs; a ſlight degree of the elephantiaſis ſicca. The blood drawn from the veins is in the fibrous parts, black, grumous, thick, and yet diſſolved; in the ſerous part, ſalt, acrid, having a yellowiſh green mucus on its ſurface:—ſharp eroding pains, which are tranſient, but increaſe at night; livid ſpots."

Boerhaave, in his account of the firſt and ſecond ſtages of this diſeaſe, ſeems to have been as juſt and as judicious as he has been fanciful and ill-founded in many of the circumſtances which he aſcribes to the third and laſt ſtages of it. Van Swieten, however, in his uſual great reverence for Boerhaave, undertakes, we ſhall ſee, to account mechanically for all theſe appearances, not only without enquiring whether they actually did occur, or not, but without conſidering even whether they were within a poſſibility of happening.

The ſymptoms of putridity here mentioned, and the univerſal tendency to gangrene, &c. are the neceſſary effects of the cauſe which has been aſſigned, and ſeem to be the phenomena of the laſt ſtage in a more advanced ſtate. From the lax flaccid ſtate of the gums, they eaſily admit of a congeſtion of blood in them, which gives a redneſs and an appearance of inflammation. It is no way extraordinary that hæmorrhages ſhould happen at this period, when the coheſion between the particles compoſing the fibres of the body is ſo much diminiſhed; but that a fatal hæmorrhage, as ſtated here, ſhould happen through inviſible pores in the ſkin, " non apparente vulnere," is no leſs unwarranted, as far as I have been able to learn, by the hiſtory of the diſeaſe, than improbable in itſelf. A thin ichorous fluid will, in ſome caſes, tranſude through the relaxed extremities of the veſſels; but that a thick black blood ſhould be puſhed through an inviſible orifice, in ſuch a ſtream as to prove fatal, is impoſſible. Boerhaave is not only ill-grounded in many of the particulars which have been mentioned, his account of the ſtate of the blood itſelf is wholly ſpeculative and contradictory. "The fibrous part is black and grumous;" the ſame part is thick and viſcid, thin and diſſolved, at the ſame time. Theſe conditions or qualities of the blood are contrary to one another, and incompatible. He adds, that the ſerum was ſalt. Dr. Lind taſted the ſerum of the blood of ſcorbutic perſons, and found that it made as little perceptible impreſſion on the tongue as the white of an egg. Independently of this teſtimony, had the ſerum been acrid, nothing would have been ſo likely to attenuate the thick viſcidity of the craſſamentum, as the ſaline tenuity of the ſerous parts; nor would any thing have been ſo proper to blunt and ſheath the acrimony of the ſerum, as the thick craſſamentum, with which it would have been conſtantly agitated in the circulation. Thus the vice of one part of the blood would have promiſed to remedy the depravity of the other; and one ſhould have found it difficult to conceive, on Boerhaave's principles, how any diſeaſe could have ariſen. But his ideas of the properties of the blood in the ſcurvy ſeem to be wholly groundleſs. They are hypotheſes invented to account for the pains, eroſions, &c. upon his favourite notion of acrimony; and brought forward at this period, becauſe he did not appear to have any other means of accounting for thoſe ſymptoms. We are in the next place informed, that ulcers of the worſt kind appeared in various parts of the body: from whence could theſe ulcers ariſe, but from that weakneſs which favours congeſtions in particular parts, and from that teneritudo fibrarum, which renders the fibres in thoſe parts capable of being eaſily broken, and of degenerating in this ſtate of the body into foul ſores? And yet, in this weak ſtate, in this ſtate of diminiſhed coheſion in the ſolids, thick blood is ſaid by Boerhaave to be driven through the ſkin, in a quantity, and with a velocity to produce death, without occaſioning a ſolutio continui, (hæmorrhagiæ ſæpe lethales ex ipſâ cute externâ, non apparente vulnere.) The idea is much too abſurd to merit attention. Boerhaave has not only given us here his ſpeculative notions as real occurrences: if any man having the ſcurvy, happened to be attacked with any other complaint, this was at once ſet down as one of the ſymptoms of the diſeaſe of which we are ſpeaking. Hence, in the liſt before us, we ſee the elephantiaſis, malignant fevers, the dyſentery, mentioned. The difference between the elephantiaſis and ſcurvy is ſo well known, as hardly to need to be pointed out. The former is compatible with the ſtrength of the body. Perſons afflicted with it are not hindered from following their accuſtomed occupations, or their daily labour. The very eſſence of the ſcurvy is weakneſs. People attacked with it ſink and faint under the leaſt exertion. A late ingenious traveller * informs us, that the Icelanders, who are very ſubject to the former, are but rarely afflicted with the latter. There are reſpectable writers who aſſert, that perſons in the ſcurvy are leſs liable to the attack of malignant fevers than others. But ſhould theſe invade people in the ſcurvy, as they may happen to do others, they are to be conſidered as accidental occurrences, and are by no means to be counted in the liſt of the neceſſary and eſſential ſymptoms of ſcurvy. The ſame may be ſaid of the dyſentery. Bloody ſtools, indeed, are frequent in the ſcurvy, from the diſ-

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* Dr. Uno Van Troil.

poſition to hæmorrhage which has been mentioned. But bloody ſtools alone do not conſtitute the character of the dyſentery. The only ſymptoms mentioned by Boerhaave in the fourth ſtage, about which authors, as far as I can learn, are agreed, are, the "ſtrangury, the faintings, the dropſy, convulſions, the tremor and palſy, the contraction."

It will, I believe, appear no ways extraordinary, that the urine in this diſeaſe ſhould be high-coloured, acrid, and ſometimes attended with a ſtrangury, when it is recollected that mariners are rarely afflicted with it to a great degree, till they are reduced to a ſhort allowance of ſmall-beer and water. The ſtate and facility of this ſecretion, we know, depend much on the diluting liquors received into the body.

The anxiety and faintings are occaſioned by the oppreſſion of the heart, from thoſe fluids it has no longer ſtrength to propel.

So great is the accumulation of blood about the vital organ, that it has the effect, as has been found on diſſection, of diſtending its cavities to a large ſize, to the ſize even of the fiſt. I have elſewhere ſhown *, that a weakneſs of the vital powers is one of the principal cauſes of the dropſy, an effect which in the caſe of the ſcurvy is increaſed by the obſtruction to the circulation from a difficult reſpiration. It has been obſerved in every ſtage of this diſeaſe, that great hæmorrhages are apt to occur; and it is well known that great and ſudden loſſes of blood ‡ are frequent cauſes of convulſions, and they

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* V. Animadverſiones de Naturâ Hydropis ejuſque Curatione.

‡ It may here naturally be aſked, and it will be a curious and an important queſtion to reſolve, how hæmorrhages ſhould produce convulſions.

It is generally believed by phyſicians, ſays Fontana, that convulſions ariſe from a too great quantity of the nervous fluid, giving exceſſive irritation to the muſcular fibres. But the truth is, that the weakeſt people they ſeem therefore to have been juſtly deemed by Van Swieten, to be the ſource of theſe evils in the preſent caſe. Strong, however,

people ordinarily are the moſt ſubject to thoſe complaints; nor does it ſeem probable that a greater quantity of animal ſpirits ſhould be ſecreted in the brain of ſuch perſons, than in thoſe of people in high health, and who live on the moſt nouriſhing food. They who die after great hæmorrhages, women particularly in child-bed, who have ſuffered great loſſes of blood, are obſerved to be ſubject to ſtrong convulſions, and to have ſuch motions excited as they would be incapable of in health. Animals killed by bleeding are liable to the ſtrongeſt convulſions; and theſe are greateſt as their ſtrength is leſs, and their blood is almoſt entirely diſcharged. It would be ridiculous, and repugnant to reaſon, to have recourſe to too great quantity, or the too great impetus of the animal ſpirits, to account for theſe caſes, ſince there is ſcarcely any blood or circulation of humours from which they may be ſecreted, or any ſtrength in the body by which they may be impelled with extraordinary force to excite the contractions of the muſcular fibres. The account which Fontana gives of theſe phenomena, ſeems to me the moſt ſatisfactory of any I have ſeen, and is the only one however, as are the convulſions occaſioned by hæmorrhages in ſome circumſtances, they

one reconcileable to common ſenſe. I ſhall give it in his own words.

" Quel giuſto equilibrio di forza, e di tenſione tra fibra e fibra, e tra muſcolo e muſcolo, che vi è da ſano, e che è mantenuto nel muſcolo da quella proporzionata copia d'umori che ordinariamente riceve, manca nella macchina animale ammalata. Ogni muſcolo benche rilaſciato conſerva un certo grado di tenſione in tutte le ſue fibre, per cui ſi equilibria con i muſcoli antagoniſti e rimane coſi in quiete. Queſta verita ſi dimoſtra col tagliare per traverſo alcune fibre del muſcolo, perche ſubito queſte fibre tagliate ſi ritirano verſo gli eſtremi fiſſi e laſciano una larga apertura.

Oltre di ciò ſi oſſerva, che ſe un muſcolo diventa paralitico, il ſuo vicino antagoniſta ſubito di per ſe ſi accorcia e ſi contrae e ſe lo avvicina quantunque le fibre di queſt' ultimo non ſiano ſtimolate di piu del ſolito da alcun nuovo affluſſo di fluido. Ne ſolamente i fluidi piu groſſi del corpo animale, ma ancora il fluido nerveo concorrono a far queſta tenſione nel muſcolo e a mantenere le forze motrici dell' animale in un giuſto equilibrio. Mancano affatto o in qualche parte queſti fluidi they are rather ſlight tremors, than ſtrong convulſions, to which the ſcorbutic are ob-

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fluidi in quei muſcoli convulſi, o vi periſcono e ſcemano irregolamente, non eſſendo mai da ſupporſi una proporzionata uguaglianza di perdita di umori in tante parti, e dove la circolazione e tanto ineguale, e coſi diminuito con irregolarita il fluido dentro la fibra viene anche levato l'equilibrio tra muſcolo e muſcolo, tra fibra e fibra equindi i tremori, le convulſioni.

Dal fin qui detto ſopra le convulſioni ſi puo cavare la ſoluzione d'una gran difficoltà fatta da uomini ſommi, i quali eſcludono fino i nervi dal moto dei muſcoli, appunto perchè nelle abbondante perdite di ſangue ſi riſvegliano nell' animale convulſione tali, che ſenza quelle perdite ecceſſive non ſarebbero mai ſeguite. In queſti caſi le convulſioné naſcono per l'equilibrio levato tra muſcolo e muſcolo, perché il ſangue ſcema allora inegualmente nei diverſi canali; laddove queſti canali ſi vuotano con tanto maggior diſordine, ed ineguaglianza, quanto le perdite di ſangue ſono più grandi, e più iſtantance, non poſſono ſi ſubito con rarſi con quella uguaglianza e armonia naturale, onde le fibre muſcolari vengono ſtirate o premute più o meno e quindi vi ſi riſvegliano ſtraordinarj moti e gagliarde contrazioni. Infatti ſi vede che le perdite di ſangue benchè grandi fatte più

lentamente

ſerved to be ſubject. They generally faint and die on the leaſt exerciſe, without any inordinate motion whatever. Sailors afflicted with a great degree of this diſeaſe, often expire in an inſtant, upon being brought upon deck. The vital power, the efficient cauſe of contraction, being in all theſe caſes diminiſhed, and in ſome almoſt

lentamente non cagionano nei muſcoli quei moti o non tanto grandi, perchè ſi dà luogo ai vaſi di reſtringerſi egualmente, e agli umori di ſcorrere per quelli con maggiore uniformità.—Ma che tutti queſti moti naſcano veramente dal diſtrutto equilibrio nelle fibre muſcolari, appariſce chiaramenta da un eſperienza da me fatta più e più volte.—A un dato muſcolo, per eſempio del collo, attaccato per una parte al cranio, e pendente per l'altra, ſi può eccitare il moto quando non l'abbia, e accreſcerlo quando lo ha, col ſolo fargli un taglio in guiſa, che parte delle ſue fibre reſti reciſa, intatte le altre, in ſomma facendo in modo che quei fili non foſſero più teſi tutti, come prima, e ſi toglieſſe in eſſi il ſolito equilibrio. E di qui naſce che i muſcoli del collo, e d'altre parti ſi movono con più forza e per più tempo, quando ſono attaccati da ambedue le parti.

deſtroyed, it is no ways extraordinary, that perſons in ſuch ſituations ſhould die frequently without an effort. The little portion, however, of the vital power remaining, is more likely to be excited by hæmorrhages, than by any other cauſe.

The paralyſis in the ſcurvy has long been remarked to be of a peculiar kind, and ſeems to afford a ſtrong inſtance of that ſort of paralyſis mentioned by Fontana, as depending on the deſtruction of the vital power in the muſcle, and not upon any injury of the nerve going to it. The ſcorbutic paralyſis has been diſtinguiſhed from ſuch an affection depending on the nerves by this circumſtance, " quod, licet robur et firmitas pereant membris affectis paralyſi ſcorbuticâ, tamen in pleriſque aliquis motus maneat et quidem per intervalla ille motus augeatur et minuatur denuo." The ſcorbutic paralyſis eaſily gives way to remedies, whereas the paralyſis from an injury of the nerves is a chronical obſtinate complaint, not often cured. Van Swieten himſelf acquits the nerves of having any ſhare in occaſioning the ſcorbutic paralyſis, and he aſcribes it to the deſtruction of the texture of the muſcle itſelf. From whence does this deſtroyed texture ariſe, but from the great diminution of the vital power ordinarily inherent in the muſcular fibre itſelf? * It is not wholly annihilated;

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* "Poſſono dunque darſi delle paraliſie, ſpecialmente di qualche membro particolare per ſolo vizio di muſcoli, ſenza che il difetto venga dal fluido nerveo. Ed è poi certo che nelle gran debolezze della machina e in quelle malattie, nelle quali vengono attaccate principalmente le forze dell' animale in modo che non puo piu reggerſi, e ſervirſi de' ſuoi muſcoli, la cauſa principale è la perduta irritabilita della fibra.—Le Febbri d'Armata, di Carceri, lo Scorbuto, le febbri peſtilenziali, l'iſteſſa peſte, e tutte le febbri putride ſono in queſto numero. Nella fibra motrice ſi fa la gran mutazione per riguardo ai moti dell' animale, e la meno frequenti e deboli vibrazione del cuore moſtrano evidentemente che è attaccato il ſyſtema muſculare; imperciocche quel muſculo non riconoſce altro ſtimolo, altra cauſa del ſuo moto

lated; for ſome little motion remains. This power of motion is occaſionally increaſed. The defect of it is eaſily and entirely removed by remedies; for which we can only account by the facility with which the vital power is known to reſtore itſelf in ſome diſeaſes, when the obſtacles in its way, and the cauſes diminiſhing it, are removed.

Contraction.—Contractura.

"In paralyſi," ſays Van Swieten, "aderat laxa immobilitas verum in contracturâ muſculi rigidi potius ſunt et immobiles ſimul." After having remarked, at the beginning of the ſentence, the immobility of the muſcles as ariſing from their laxity and deſtroyed texture, it is ſingular that a man of Van Swieten's abilities ſhould ſup-

moto che il ſangue venoſo il quale ſeguita a portarſi ai ſuoi ventricoli anco in quelle gravi malattie come prima." V. Ricerche, Page 52.—The frequency of the pulſe is not in general diminiſhed in putrid fevers; on the contrary, it is for the moſt part increaſed. The increaſed frequency, where it takes place, will hereafter be explained conſiſtently with Fontana's principles.

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poſe this laxity changed at once into the oppoſite ſtate of rigidity, and that he ſhould aſſert the exiſtence of ſo viſionary a cauſe, when he himſelf, on the authority of Poupart, teaches us the only and real ſource of this contraction and immobility. "Poupartius invenit, ſays Van Swieten, in cadaveribus muſculos inflatos, *duros inſtar ligni*, ob ſanguinem extravaſatum inter muſcularem carnem hærentem." In another place, explaining this very ſymptom, he ſays, "Obſervavit hoc malum in ſcorbuticis Poupart, muſculis ligni inſtar rigeſcentibus, ob ſanguinem copioſum coagulatum quo turgebant." The diſtention in ſize muſt neceſſarily produce an abridgement of the length of the muſcle, and thus occaſion the contraction of the limb to which it is annexed.

A ſluggiſhneſs, then, a torpor, and a weakneſs which comes on ſlowly, and increaſes gradually, and is marked by a feebleneſs of action in all the voluntary muſcles, and by a ſmall, weak, unequal pulſe, are the firſt effects of the proximate cauſe of the ſcurvy. In the ſecond ſtage of this complaint, theſe affections increaſe. The muſcles of the thorax can neither with eaſe nor with readineſs dilate the cheſt, ſo that reſpiration becomes difficult. The voluntary muſcles can be no longer commanded. The extremities become immoveable. The coheſion between the particles of the muſcular fibres is evidently impaired; theſe lengthen *, they become ſoft, flaccid, and then ſo tender that the coats of the veſſels break on the leaſt touch, and pour out their liquid contents, which occaſion ſpots under the ſkin, and various appearances,

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* Diſſections have ſhewn, that the fibres of the heart have been lengthened, and its ventricles diſtended to a moſt enormous and unnatural ſize. The muſcles of the arms and legs have been found by the ſame means to be quite lax, tender, and inclining to corruption. See Dr. Lind's Poſtſcript to his book on the Scurvy.

ances. The broken fibres of the gums corrupt and taint the breath, and an univerſal diſpoſition to gangrene takes place. Fontana ſhows, that where the force of the muſcular fibre is impaired, it is owing to an injury of that property of it, its vital power. He ſhows, that where the vital power is diminiſhed, or deſtroyed, it is accompanied with a proportional weakneſs of the fibre, with a diminiſhed coheſion between its particles, with a lengthening, and a ſoft lax ſtate of it, and a great tendency to putrefaction. The ſame affections being conſpicuous in the diſeaſe of which I am ſpeaking, I think myſelf warranted in referring them to the ſame cauſe, and to conclude, that the ſcurvy is not a diſeaſe of the fluids, but of the ſolids; that its ſeat is in the muſcular fibre; that its proximate cauſe conſiſts in a gradual diminution of the vital power by the remote cauſes of this diſeaſe; that the torpor, weakneſs, &c. obſerved in all the functions, are the firſt effects of the proximate cauſe, the diminution of the vital

power;

power; and that the ſubſequent diminiſhed coheſion between the particles of the muſcular fibres, and the tendency of theſe to putrefaction, are links of the chain, and are ultimately derived from the ſame ſource.

This view of the ſubject may lead us to an explanation of many occurrences in the hiſtory of the ſcurvy, which, if it were ſeen in any other light, might not be of ſo eaſy ſolution. If we conſider the remote cauſes of this diſeaſe ſeparately, we ſhall perceive, that whilſt they have a direct relation and connection with the vital power, the properties of moſt of them, ſo far from immediately conveying any putridity to the fluids of the body, are themſelves in their nature antiſeptic. The impaired ſtate of the vital power is the moſt ſtriking feature in the conſtitution of perſons prediſpoſed to this complaint. It is the diminution of this principle which conſtitutes the weakneſs in the fibres of perſons juſt recovered from acute diſeaſes: moderate cold braces, but the exceſſive cold of Greenland, and other places, which prediſpoſes to the ſcurvy, though antiſeptic in its properties, yet is extremely inimical to the moving powers of the machine. It benumbs thoſe faculties, and has been known ſo entirely to deſtroy the vital power, as to bring on ſudden gangrene and death. A ſudden check of perſpiration has generally ſtimulant effects; but whether that ſtimulant operation be continued by the ſlow and gradual ſuppreſſion of it which takes place in the ſcurvy, and perſons are prediſpoſed to this diſeaſe by the vital power being thereby diminiſhed and exhauſted, (an effect which long-continued ſtimuli will have;) or whether the ſlow and gradual ſuppreſſion of that evacuation, when its almoſt vicarious ſecretion by the kidneys, from the deficiency of drinks, is conſiderably leſſened, occaſions the retention of impure particles, which by their weakening or ſedative qualities may impair the vital power, may admit of much diſcuſſion.

ſion. The languor in all the functions of perſons in the hypochondriaſis, and the torpor of the moving fibres in ſorrowful affections of the mind, beſpeak ſome injury of the vital power. Though the moſt acute obſerver would find it difficult to point out any common quality in the fluids of the various perſons prediſpoſed to the ſcurvy, which ſhould incline them to it, yet the prediſpoſing cauſes have all of them a tendency, more or leſs, to impair the vital power.

But if an injury of this principle is to be traced in the ſtate of prediſpoſition to this complaint, how much more ſtrongly marked is the tendency of its occaſional cauſes to diminiſh that ſource of motion in our bodies? If we ſhould refer this complaint to a peculiar taint of the fluids, it would be difficult to conceive how it could be derived from matters of ſuch oppoſite properties as animal and vegetable ſubſtances; from matters ſo oppoſite in their natures, as the ſalt-diet of ſailors, and the farinaceous puddings of the Bohemians. But when, agreeably to the idea of Dr. Lind, we conſider that ſalt-proviſions tend to excite the ſcurvy, not by their ſaline, but by their indigeſtible nature; and that the glutinous pudding, juſt mentioned, oppreſſes the ſtomach as much as ſalted meats; our difficulties are much leſſened. For all indigeſtible ſubſtances, whatever their chemical properties may be, wear the force of the body. By diminiſhing the vital principle, they induce a languor on all its functions. A want of ſufficient nouriſhment muſt have a ſimilar operation. A weakneſs of the fibres, the neceſſary and immediate offspring of an injury of their vital power, is its firſt effect; a general diſpoſition to putridity its regular conſequence. That this diſpoſition to putridity reſults from a diminution of the vital power, and not from a putrid ferment acting upon the blood, is proved by many circumſtances. A putridity could not be communicated to the blood of the poor Italians by the decoctions of the vegetable roots which they uſed; nor to that of the poor women whoſe caſes are related in the Medical Tranſactions of the College *, by the infuſion of tea which they drank. Such liquids, it ſhould ſeem, were well calculated to waſh off any impurities from the fluids, and to diſcharge them by the emunctories; or ſhould they remain, (if the doctrine of antiſeptics were true) we might with reaſon expect theſe infuſions, as powerful antiſeptics, to correct ſuch impurities, and to render them innocent. But, not having a ſufficient quantity of nutritious matter in them to repair the daily waſte of the machine, the vital power,

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* In a paper which I had many years ſince the honour of tranſmitting to the College, I adopted Sir J. Pringle's idea of a gradually-accumulated putrefaction; but a reference to thoſe who have examined the actual ſtate of the blood in the ſcurvy, has taught me the groundleſſneſs of ſuch a notion.

and the force of the fibre, muſt neceſſarily decline, and the general diſpoſition to putridity take place. Suppoſing, however, either in the caſe of a want of ſufficient nouriſhment, or in that of a ſlow and gradual ſuppreſſion of perſpiration, at a time when, from a deficiency of drinks, the ſecretion from the kidneys cannot have been properly promoted; ſuppoſing, I ſay, impure particles to be retained in the body, and to be received into the circulation, (a circumſtance in either ſituation which appears to me highly probable) they are not ſufficient to be diſcernible in the maſs; they do not ſenſibly, in the ſcurvy, alter the mixture of the blood. Far from being warranted to ſay, that ſuch impurities produce the diſeaſe by aſſimilating the blood to their own putrid natures, we may be juſtified in aſſerting the contrary: for the blood in the laſt ſtage of the complaint, and even when it has occaſioned death, is not in the putrid ſtate which has been aſcribed to it at the beginning, and which has been ſaid to conſtitute the proximate cauſe from which all its ſymptoms have been derived. When ſuch impurities, therefore, find their way into the circulation, they muſt, I ſhould conceive, act like the other occaſional cauſes, and impair the vital principle by their weakening, or ſedative qualities. Sudden fear is one of the cauſes which excites the ſcurvy the moſt readily; but can it at once convert the blood into an acrid or a putrid ſtate? Though it would be impoſſible to account for its operation in this way, yet the near relation * which ſubſiſts between the animal and vital powers of the body is matter of old remark, and

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* Animalis etiam vis, quæ ſenſus regit, cum vi vitali communicat et vehementer affecta huic pro irritamento eſſe poteſt ut hæc viciſſim illi. Quocirca, et mentem hominis iſti commercio implicitam eſſe conſtat. Gaubii Pathol. p. 75.

preſents us with an eaſy and a natural ſolution of it. It is a known fact, that ſuch affections of the mind are conſtantly followed by a diminution of the vital power; the weak ſlow pulſe, and languor in all the motions of the body attendant upon them, prove it. We may live on a ſalt-diet for years: its juices may be mixed with our blood for a long period without miſchief. If the vital power be not diminiſhed, and a torpor and weakneſs produced, the ſcurvy will have no exiſtence. The experienced Dr. Lind aſſures us, that he has known meſſes, as they are called, of ſeamen, who have lived for the ſpace of three years on the ſhip's proviſions, for want of money to purchaſe better fare, and eſpecially greens, and yet have kept free from the ſcurvy. All theſe circumſtances tend to explode the idea of this diſeaſe, being conſtituted by a gradually-accumulated putrefaction from ſuch a food, and to corroborate the opinion

I have delivered relative to its proximate cauſe. A little further reſearch into the hiſtory of putrid diſeaſes may tend, perhaps, to add confirmation to the doctrine I have advanced.

CHAP. VII.

Of the general Character of putrid Fevers.

DOCTOR Cullen gives the following conciſe character of the Typhus (the genus of fevers under which he ranks the various ſpecies of thoſe commonly termed putrid); * that it is a contagious diſeaſe, in which the heat of the body is very little increaſed; the pulſe is ſmall and weak, but, for the moſt part, frequent; the urine undergoes very little change: but the functions of the brain are extremely deranged, and the ſtrength of the body is much diminiſhed.

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* G. V. Typhus.

Morbus contagioſus; calor parum auctus; pulſus parvus, debilis, plerumque frequens; urina parum mutata; ſenſorii functiones plurimum turbatæ; vires multum imminutæ.

CHAP. VIII.

Of the prediſpoſing Cauſes of putrid Fevers.

WITH reſpect to the remote cauſes of fevers in general, we are but little informed: but, imperfect as our knowledge is, experience has taught us, that perſons in ſome ſituations are more ſuſceptible of epidemic contagions, and of putrid fevers, than others in different circumſtances. People who inhabit damp houſes, or who live in modes of uncleanlineſs, are particularly liable to them. The plague is often prevalent in thoſe parts of Conſtantinople where the people are conſtantly employed in waſhing linen, and the Jews, in the ſame city, from their inattention to cleanlineſs, are ravaged by it, at a time when others ſuffer but little from its virulence. An indigeſtible diet, or intemperance in eating, fatigue, and every cauſe which depreſſes the force of the body, renders people very ſuſceptible of epidemic complaints. Fear, and all the debilitating affections of the mind, give a rapidity to the progreſs of contagion. Perſons expoſed, during ſleep, to noxious effluvia from marſhes, are particularly apt to ſuffer from their influence. A ſtranger going to paſs the night in the neighbourhood of Rome, at a certain ſeaſon of the year, is almoſt ſure to be attacked with the putrid fever of that country.—Theſe are the principal conditions under which the human body is obſerved to be prediſpoſed to putrid fevers.

CHAP. IX.

Of the occaſional or exciting Cauſes of putrid Fevers, and of the Means of defeating their Operation.

THE chief exciting cauſe of theſe complaints, is contagion; under which term I would include all ſorts of matter occaſioning putrid fevers *, as well that active poiſon, which is generated by unclean perſons in priſons, or confined places, as thoſe noxious effluvia which ariſe from low, marſhy, unwholeſome grounds. As the ſpecific nature of all ſuch matters is entirely unknown to us, and as experience has not yet taught us any antidote by which we can diſarm them of their virulence, the prevention of the diſeaſes, which they are apt to occaſion, muſt depend principally upon our correction of that ſtate of our body by which we are prediſpoſed to them, and upon our avoiding, as much as poſſible, the exciting cauſes, at that time eſpecially when we feel ourſelves under the influence of any of the prediſpoſing ones. — Cleanlineſs cannot therefore be too much attended to. In hoſpitals, and in jails, on board ſhip, and in every ſituation where a number of people are crouded into a ſmall ſpace, authority ſhould be employed to enforce it. Intemperance, both in eating and drinking, ſhould be carefully avoided during the prevalence of a putrid epidemic diſeaſe. The French phyſicians have aſſured us, that the moſt certain preſervative againſt the plague which appeared at Marſeilles, was temperance, and the uſe of food of eaſy digeſtion. But whilſt exceſs of every kind is to be ſhunned, and moderation in our diet is to be ſtrictly obſerved, we ſhould likewiſe be cautious not to run into the oppoſite extreme of too great abſtinence. Æque cavendum eſſe a crapulâ atque ab inediâ, is advice which we derive from high authority. I have remarked, that every thing tending to weaken the powers of the animal machine, which too long faſting is apt to do, renders the body ſuſceptible of impreſſions from morbid cauſes which it otherwiſe might not feel. The ſlight diminution of force * in the action of the vital powers during ſleep, is probably the

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* V. Typhus gravior of Dr. Cullen.

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* Hippocrates (Lib. de Flatibus) obſerves, ὅταν γαρ ἐπέλθη τω σωματι ὁ ὕπνος, τότε το αἷμα ψύχεται. Φύσει γαρ πεφυκεν ὁ ὕπνος ψυχειν. Ψυχθέντος δὲ του αιματος, νωθροτεραι γίνονται αἱ διεξοδοι. Lanciſi tranſlates this paſſage, and adds a commentary to illuſtrate it. Quum ſomnus corpus invaſerit, ſanguis frigeſit ; a naturâ enim ſomno frigefaciendi (hoc eſt minùs movendi) vis eſt. Infrigidato autem ſanguine, languidiores fiunt ejus meatus. — Hoc autem languore efficitur, ut, irrumpentibus undequaque malignis effluviis, patentiores ſint aditus et propulſandi facultas imbecillior.

circumſtance which renders it ſo dangerous to people, unaccuſtomed to ſuch an air, to paſs the night in the neighbourhood of Rome. We ſhould therefore not only ſtudiouſly avoid every enfeebling power, but endeavour to correct that ſlight ſenſe of weakneſs, which too long faſting is apt to give. Lanciſi, with this view, recommended it to every one at Rome, never to go out of a morning at an unhealthy period with an empty ſtomach, but to eat a piece of bread ſoaked in wine, or ſome other thing to ſtrengthen that organ. The uſe in Italy, as well as in Sicily, of iced liquors, is ſaid to have been attended with the moſt beneficial conſequences. Plempius * relates, that the plague, or (we ſhould

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* Refert Plempius, " poſt uſum nivis vino refrigerando inventum rarius quam ſolebat peſtilentiam Siciliæ regnum invadere: quod confirmari ait a Balthaſſare Piſanello qui tradit diligenti obſervatione exploratum eſſe in urbe Meſſanâ quotannis mille numero pauciores quam ante uſum nivis interire. V. Lanciſi opera, tom. iii. p. 172.

rather ſay, putrid fevers have been much leſs frequent in Sicily ſince the cuſtom of icing their liquors has prevailed: and another phyſician, upon the authority of a diligent enquiry, aſſured him, that the deaths in one city only had been fewer by a thouſand annually ſince the introduction of that practice. In unhealthy ſeaſons, the phyſicians who have practiſed in Hungary have commended the Peruvian bark as a preſervative: but I profeſs, unleſs it be under the circumſtance of a prediſpoſing ſtate of great weakneſs from a previous illneſs (which was generally the caſe when the bark proved ſo advantageous in Hungary) I ſhould rather be inclined to reſerve ſuch a remedy for other and more urgent purpoſes, being in general diſpoſed to think, that medicines are more calculated to relieve in the exigency of diſeaſe, than to be uſeful as the auxiliaries of health.—It was probably owing to their regular mode of living, to their avoiding that weakneſs which intemperance or improper food is apt to give, that the committee of thirteen phyſicians, who were appointed by the empreſs of Ruſſia to attend thoſe ill of the plague at Moſcow, in 1771, for the moſt part eſcaped the diſeaſe *. Their freedom from that fear with which the common people are generally impreſſed during the prevalence of ſuch a complaint, may have contributed ſomewhat, perhaps, likewiſe, to their exemption. They uſed no other precaution than to avoid touching the perſon, the cloaths, and the beds of their patients.

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* In ſolam plebem, ut ſemper accidit, ſæviit peſtis. Inter nobiles et ditiores mercatores, neminem fere, præter paucos valde incautos, invaſit. Solo ægrorum et rerum infectarum contactu communicabatur, atque atmoſphæra contagium non ſpargebat; ſed ſaniſſima ſemper fuit. Viſitando tam propè adſtabamus illis ut ſola pedis diſtantia inter nos et eos ſæpe vix remaneret, et abſque aliâ quacunque cautelâ, quam quod nec corpus neque veſtes aut lectum tangeremus a peſte immunes permanſimus. Linguam, proprius obſervando, ſolebam

patients. Dr. Mærtens, indeed, when he approached very near them, to look at their tongues, uſed to ſtuff a piece of cloth, dipped in vinegar, up his noſtrils; and he inferred from the good fortune of himſelf and his brethren in eſcaping the plague, that the infection of it could only be communicated by the contact of the cloaths or perſons of the diſeaſed; and that it could not be received by the conveyance of the air. Contact of the cloaths or perſons of the infected, is doubtleſs the moſt certain and moſt frequent means of communicating the contagion, and ſhould therefore be avoided

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ſolebam linteum aceto communi imbutum naribus et ori admovere. V. Mærteus Hiſtoria Peſtis Moſcuenſis, anni 1771. — It is no ways extraordinary, that the common people ſhould be particularly apt to ſuffer from this calamity; they are moſt liable to its prediſpoſing cauſes. A bad diet, an irregular mode of living, a want of cleanlineſs, expoſure to fatigue, to the viciſſitudes of heat and cold, are almoſt inſeparable from their condition. They too have leſs power of avoiding to touch thoſe things which may be ſuppoſed to convey the infection.

with the moſt ſtudious care. But it does not ſeem, from Dr. Mærtens's own account, to be the only one. It does not appear, as far as I can ſee, that his friend Dr. Pogaretſchy had infringed the rule of avoiding to touch the cloaths or perſons of the ſick; and yet he had a ſlight attack of the diſeaſe. But however this may be with reſpect to the plague, it is certain that other contagious putrid diſeaſes may be communicated otherwiſe than by the contact of the infected perſons. People not within reach of the priſoners at Oxford, were attacked with the gaol-fever before they left the court of aſſize; and that ſource of putrid diſeaſes, the noxious effluvia from marſhes, can have no other vehicle than the air to apply them to our bodies. Our means, therefore, to prevent putrid fevers, conſiſt in oppoſing and correcting their prediſpoſing cauſes. It was to theſe objects that the ancient phyſicians with great wiſdom directed their attention. The advice of Celſus contains nearly every thing which can at preſent be ſaid upon this ſubject. "Vitare oportet," ſays he, "fatigationem, cruditatem, frigus, calorem, libidinem: tam neque mane ſurgendum, neque pedibus nudis ambulandum, minimèque poſt cibum. Cum vero hæc in omni peſtilentia facienda ſint, tum in eâ maximè quam auſtri excitarint *."

Some of the more modern phyſicians, however, not content with inculcating the obſervance of theſe rules, flatter themſelves with the idea of poſſeſſing remedies againſt the exciting cauſes of putrid fevers. They have conceived themſelves to have diſcovered antidotes capable of correcting or changing the contagious or poiſonous matters, or of defending the body againſt any taint or impreſſion from them. Silvius pretended not only to have been preſerved from the infection of the plague for a long time

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* This refers to the putrid fevers which were excited by noxious effluvia from marſhes.

by the vegetable acids, but to have been once freed from a weight and pain in his head, which he imagined to have been the conſequence of an actual attack of the diſeaſe. Diemerbroeck recommends the ſmoking tobacco. During the prevalence of the plague, he made daily uſe of his pipe; and eſcaped the diſtemper. A learned gentleman of our country, Sir J. Pringle, obſerves, that the plague, peſtilential fevers, and putrid ſcurvies, &c. have abated in Europe, during this laſt century; a bleſſing which he aſcribes to our improvement in every thing relating to cleanlineſs, and to the general uſe of antiſeptics. He ſays, that hopped beer, wine, and vinous liquors coming more into general uſe, have been ſome means of ſuppreſſing putrid diſeaſes; that greens and fruits are more univerſally eaten, and ſalted meats make a leſs part of our diet than formerly. To this he adds the more general uſe of tea and ſugar, which being, according to his experiments, conſiderable antiſeptics, concur to produce the ſame effects. We know that epidemical diſeaſes vary extremely, both in their number and in their natures, at different periods; but there are no principles, I am apt to believe, which will enable us to account for ſuch differences. Acidulated drinks are both agreeable and beneficial. Vegetables are very wholeſome ingredients in our diet. The former cool the body, the latter are ſucculent, they promote the ſolution of our food, they are prone to ferment, they facilitate the digeſtion of it. By the uſe of ſuch things, we may doubtleſs be the leſs apt to be prediſpoſed to putrid fevers; but that the articles which have been mentioned have a power, by any antiſeptic or other effect, of diſarming the occaſional cauſes of ſuch complaints, or of defending our bodies againſt their impreſſions, is contradicted by the experience of every country. The Turks ſuffer exceedingly from the plague, though they are in the conſtant uſe of the vegetable acids in their ſherbet. At Marſeilles, thoſe who could afford to make uſe of vinegar in every way, who had pails full of it ſtanding conſtantly at their doors, with which they purified every thing which was brought to them, did not eſcape the plague more than their neighbours, who had no ſuch advantages. In the ſouthern parts of France and Italy, putrid fevers of various deſcriptions are very frequent; and though the lower ſort of people live chiefly, if not wholly, on vegetable food during ſummer and autumn; though acid wines be their conſtant drink; yet at theſe periods, they are more viſited by ſuch fevers than at other times. It may be ſaid, perhaps, that the heat of theſe countries exalts the virulence of contagion—that it favours the production of noxious effluvia. I am very ready to admit it. But with the bane, is not the antidote produced in proportional abundance? If vegetables, if acid wines, &c. as antiſeptics, had any power of counteracting theſe poiſons, either by changing their natures, or by impregnating the body with any qualities to enable it to reſiſt their impreſſions, the inhabitants of the countries juſt mentioned ſhould be wholly exempt from the calamities they occaſion. But unfortunately for them, and for ſuch doctrines, the fact is quite otherwiſe. Experience ſeems alſo to contradict the advice of Diemerbroeck. Smoking tobacco to correct the humidity of the air in a moiſt climate, may tend to prevent a prediſpoſition to ſome fevers; but it affords no defence againſt an epidemical infection. The Turks ſmoke more tobacco than other people, and yet they ſuffer the moſt from the plague. When this diſtemper broke out at Moſcow in 1771, the Ruſſians had great reliance on ſmoking for protection from it; but the event ſhowed upon what fallacious grounds they had placed their ſecurity; for in that ſingle city twenty-ſeven thouſand perſons were carried off by the diſeaſe, in the month of September only.

CHAP. X.

Of certain Opinions which have been maintained with reſpect to the Nature of the proximate Cauſe of Putrid Fevers.

THE occaſional cauſes of putrid fevers ariſing from impure ſources, generated poſſibly by unclean perſons in confined places, or proceeding, as has been ſaid, from low marſhy grounds, have themſelves been preſumed for that reaſon to be putrid *, and to produce the ſeveral diſeaſes ariſing from them, by aſſimilating the blood to their own impure corrupt natures. Before I enter upon the examination of this point, I cannot but expreſs my regret, that, notwithſtanding the continual alluſions, in medical writings, to the doctrine of ferments, phyſicians have not explained, with the preciſion that could be wiſhed,

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* There ſeems to be ſome reaſon to doubt the ſtrict juſtneſs of this inference. It ſhould be remembered that the volatile alkali, an antiſeptic, is itſelf the offſpring

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ſpring of putrefaction. Dr. Alexander's ingenious experiments tend to ſhow, that the effluvia from marſhes are antiſeptic. To be noxious, is it neceſſary that they ſhould be putrid? or, being putrid, would they neceſſarily be productive of putrid diſeaſes? (See Dr. Alexander's Arguments.)—Ramazzini (de Morbis Artificum) acquaints us that they were inflammations of the eyes, and not putrid fevers, to which perſons employed in cleaning the common-ſewers were liable. Is it in their progreſs to putrefaction, and not when putridity has actually taken place, that putreſcent bodies are apt to give out unwholeſome vapours? The preciſe time of their generation, as well as the ſpecific nature of contagious matters, and of noxious effluvia, ſeem to be much concealed from us.

wiſhed, the manner in which they act, or the limits to which their operation is confined in the animal œconomy. Any contagious matter lodged in the cellular texture, or other ſimilar ſituation, will ferment, and aſſimilate the ſurrounding humours to its own nature. Under theſe circumſtances, that degree of reſt obtains, which is known to be requiſite to every fermentative proceſs. But how different is the condition of this matter, when it paſſes into the circulation? There, ſo far from remaining in a relative ſtate of reſt, or in contact with any particular portion of the blood, it is as conſtantly changing its place with reſpect to the particles of that fluid, as theſe are with reſpect to each other. Hence, in diſeaſes ariſing from any ſpecific matter, though the noxious particles may be abſorbed, and floating in the blood, by ſtimulating, or weakening, may produce effects on the vital power ſuitable to their properties, the mixture of the vital fluid is not much affected.

Its ſenſible qualities are not changed. The blood in the ſmall-pox, or in the hectic fever from an abſceſs of the lungs or other parts, will be inflamed in proportion to the fever excited, but it will derive no peculiar complexion from the particular matter occaſioning that fever.

Contagious matters, it is well known, are very different in their natures. Some ſtimulate, as that of the ſmall-pox; others, as thoſe which produce putrid fevers, are weakening, or ſedative; but that theſe are ſo in conſequence of their putridity, I am neither diſpoſed to aſſert, or to deny, being unable to offer poſitive proof of either poſition. Their ſubtlety eludes examination, and renders us as incapable of pronouncing upon their condition, as upon the manner in which they are applied to our bodies to impair our health. I have no objection to agree ſo far with the common notion, which is ſo confidently aſſerted of their putridity, as to ſuppoſe it to be the caſe. I have no objection to ſuppoſe that theſe noxious contagious matters, which we will for the preſent call putrid matters, make their way into the circulation. But the queſtion is, whether, having thus got admittance into the vital ſtream, they there act as ferments, and aſſimilate the blood to their own corrupt natures, or whether they produce their miſchief by an action on the vital power, without affecting the ſenſible qualities of that fluid. This is a point of conſequence to decide; becauſe, if the latter be the caſe, to prevent the evils they tend to occaſion, we ſhould endeavour to evacuate the offending matters, or to defend that principle of our ſyſtem againſt their impreſſion. And that their operation is upon the vital power, ſeems extremely probable, not only from the advantage of obviating the prediſpoſing cauſes, and of ſtrengthening the ſyſtem in general, but likewiſe from the benefit which has been experienced, (where the occaſional cauſes have been with good reaſon ſuſpected to have actually invaded people) from emetics, laxatives, and gentle ſudorifics. But if the operation of theſe contagious matters be upon the blood, and if the doctrine of antiſeptics be well founded, we ſhould have nothing to fear from diſpenſing with ſuch troubleſome diſcipline. By pouring into the body a quantity of antiſeptics, we ſhould cruſh the ſerpent in the egg. We ſhould thereby change the corrupt nature of the exciting cauſes into a ſound ſtate, or we ſhould at leaſt guard the pure ſtate of our fluids from receiving a taint from them. We have already ſeen how contrary ſuch an expectation would be to experience.

I have ſufficiently ſhown, that the occaſional cauſes of putrid fevers are, in fact, noxious matters, for which we find no antidotes in antiſeptics. They who think highly of the virtues of theſe medicines, may perhaps from hence be led to doubt the putridity of the occaſional cauſes, as they might conceive, that had they been of that nature, antiſeptics would prove a better ſecurity to us againſt them. Others, who may have leſs faith in the preſervative and corrective qualities of ſuch articles in the animal œconomy, may ſtill think the occaſional cauſes not acquitted of putridity by the inefficacy of antiſeptics to guard us againſt them. Inſtead of reaſoning, they may bid us examine into the actual ſtate of the blood, and of the ſecretions from it, in putrid fevers. They may aſk, Have not the occaſional cauſes corrupted and diſſolved the former? Doth not the ſtate of the latter mark the corruption of the fountain from which they ſpring? I have already maintained the incompatibility of a putrid ſtate of the blood, for a moment, with animal life: but though there may be very few perſons who would contradict this general aſſertion, as being too evident to admit of a doubt, yet there are few explanations of particular diſeaſes which do not ſeem to proceed upon the contrary ſuppoſition. A putridity of the blood and humours is continually introduced by writers, to account for ſymptoms which, without the aſſiſtance of that notion, they would have been at a loſs to ſolve. People are not eaſily weaned from an inveterate prejudice by a general propoſition. They require particular refutation; which I ſhall endeavour to furniſh in the caſes before us, and ſhall be glad to join iſſue upon the grounds which have been propoſed. And firſt, with reſpect to the ſecretions:—Dr. Cullen obſerves, that one of the generic marks of the Typhus or putrid fever is, that the urine is but little changed. Where the ſtream is ſo little tainted or altered, one ſhould conceive that the ſource from which it flowed could not be very corrupt; and it ſhould ſeem to be no raſh concluſion, to infer, from the inſtance of this ſecretion, that the blood from which the urine is derived could not be in a putrid ſtate. But let us examine the blood itſelf in ſome particular ſpecies of this complaint.

In the moſt malignant of putrid fevers, is the vital fluid actually depraved in the manner in which it has been repreſented, or not? Does the moſt virulent and moſt powerful of the contagions, that of the plague, for inſtance, convert the blood into a ſtate of corruption and diſſolution? Veneſection has been performed in malignant putrid fevers, and in the plague itſelf. And what has been the ſtate of the blood drawn? It has been as various in theſe as in other diſeaſes; ſometimes coagulating firmly, at others but little diſpoſed to do ſo; and, I believe, no candid perſon will pretend, in any of the caſes, to be able to point out the cauſe of the difference. Sydenham bled a perſon ill of the fever which he calls the Febris peſtilentialis, and which he deſcribes as accompanied with unuſual ſymptoms of uncommon malignity. So firmly did this perſon's blood coagulate, that he compares it to that drawn from one in a pleuriſy. It is well known, that when the plague began to ſpread in London, Sydenham retired into the country; but returning to town when the prevalence of it was on the decline, he had an opportunity of attending ſome people ill of it. He bled one perſon three times who was known to have that diſeaſe; and he compares the blood in this caſe, likewiſe, to that drawn from a perſon in a pleuriſy *. Many obſervations of the ſame kind might, if neceſſary, be adduced. The eſſential nature, then, of the malignant peſtilential fever, and that of the plague, the proximate cauſe of the ſymptoms of the one and of the other, does not conſiſt in a putridity of the blood. Its coagulation in the inſtances which have been mentioned, refutes every idea of that ſort. Had it been putrid and diſſolved, it could not have coagulated. But though a putridity of the blood may not be the proximate cauſe of the plague,

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* Necnon ſanguinem ipſius in acetabulis refrigeratum ei qui a pleuriticis detrahitur non abſimilem fuiſſe.

let us purſue our enquiry a little further; let us examine whether ſuch a ſtate of the vital fluid be conſtantly, neceſſarily, and eſſentially connected with the diſeaſe, either as cauſe or effect. Sydenham, who was prevented by the friends of his patient ill of the plague from opening a vein a fourth time, aſcribes his death (which happened the day following the laſt operation) to that omiſſion, alledging that a fourth bleeding would have diſcharged the whole materia morbi, ſome of which remaining, he conceived, muſt have deſtroyed the texture of the blood, and thereby occaſioned death. The firſt part of the obſervation he has given us, he could not be deceived in. The coagulation of the blood was an object of mere ſight. The latter part of it, with reſpect to the imaginary effect of the remaining materia morbi in diſſolving the blood, was a ſpeculative inference, for which he does not appear to have had any foundation. He thought, as many others have done, that it muſt be ſo broken down, becauſe he could not otherwiſe account for the livid ſpots which were ſeen, and which I ſhall trace to a more certain ſource. Sydenham could not ſpeak from knowledge of the ſtate of his patient's blood after the third time of bleeding. He did not open him, to examine into the ſtate of it, after the ſpeedy death which enſued. He, who at an early period fled from the rumour of the prevalence of the diſeaſe, was not a perſon to expoſe himſelf to ſuch fearful riſks. The French phyſicians at Marſeilles had more courage or leſs apprehenſion. They diſſected the bodies of a great number of perſons who died of the plague. The report they made of the ſtate of the bodies, which is recorded, is no way equivocal *. It is a pointed contradiction of the commonly-received

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* V. Traité des cauſes, des accidens, et de la cure de la Peſte, avec un recueil d'obſervations et un detail circonſtancié des precautions qu'on a priſes pour ſubvenir

ceived notions of the putridity of the blood. The enlarged ſize of the heart, and the perfect coagulation of the blood in its cavities, were the conſtant appearances which they remarked. After a particular recital of the ſtate of the ſeveral bodies, "we have not," ſay they, "opened the bodies of any perſons who have died of the plague, without finding the four cavities of the heart extremely full, and diſtended with a thick black blood entirely coagulated. Tout grumelé, caillé, coagulé, are the various terms which they at different times make uſe of to expreſs the ſtate of the blood *. From hence

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venir aux beſoins des peuples affligés de cette maladie ou pour la prevenir dans des lieux qui en ſont menacés. Fait et imprimé par ordre du Roi. a Paris. Quarto.

* Nous n'avons ouvert aucun cadavre de peſtiferès ou nous n'ayons toujours trouvé les quatre cavitez du cœur extremement remplies et dilatées par un ſang epais, noir et tout grumelé. Le cœur du Sieur Bourget avoit ſi fort groſſi, qu'il fut trouvé crevé audevant de ſon ventricule droit, du cote du ſeptum medium, ſur lequel

hence they were led to believe, that a too great thickneſs of the blood was, in part at leaſt, the cauſe of this diſeaſe. It then appears, that at the moment the moſt virulent of theſe contagions, the contagion of the plague, has conſummated its miſchief, and produced death, the blood is not in the putrid diſſolved ſtate which has been aſcribed to it at the beginning of the diſeaſe, and from which all the evil was ſuppoſed to have derived its origin.

Let us now recollect the general ſymptoms, mentioned by Dr. Cullen, of the putrid fever, and let us conſider to what concluſion, with reſpect to its proximate cauſe, they will lead us. Theſe are, " a trifling increaſe of heat in the body;

lequel nous trouvames la valeur d'une livre de ſang tout caillé, qui s'etant fait jour par la dite dechirure, s'etoit extravaſé ſur ce viſcere dans la cavité du pericarde. Le foye s'eſt toujours trouvé engorgé de ſang et beaucoup plus gros que dans l'etat naturel. Traité de la Peſte, part i. p. 201.

body; a ſmall, weak, but for the moſt part frequent pulſe; the urine but little changed; the functions of the brain much diſordered; and the ſtrength of the body greatly diminiſhed." Theſe generic marks, with others, are ſeen in every ſpecies * of this diſeaſe. ‡ Debility, languor, a ſudden and exceſſive decay of ſtrength, a weakneſs without any remarkable

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* See the Typhus gravior or the more malignant putrid fever of Dr. Cullen. Under this ſpecies of the putrid fever he includes the jail-fever, the camp-fever, &c. He makes the plague a genus of the exanthemata. But whatever propriety there may be, on account of the buboes incident to it, in the place he has allotted to it in his Noſologia, the definition the learned profeſſor himſelf gives of it, juſtifies me in conſidering it here as a ſpecies of the malignant putrid fever. He defines the Peſtis, "Typhus maximè contagioſa cum ſummâ debilitate."

‡ Sic virium debilitas, languor, proſtratio, pulſûs ſine inſigni celeritate imbecillitas, temulentiæ æmulâ capitis hebetudo, dolor, gravitas, ſtupor, vertigo, oculorum vigor a ſe ipſo alienus, linguæ flacciditas, tremor,

remarkable quickneſs of the pulſe, an heavineſs of the head reſembling a ſtate of drunkenneſs, a ſtupor, a vertigo, a dullneſs of the eyes, a flaccidity of the tongue, a tremor of the ſame with an incapacity to articulate, with many other ſymptoms, occur, ſays Chenot, more frequently, more quickly, and with greater violence, at the firſt attack of the plague, than in any of the ordinary diſeaſes of this claſs. From theſe circumſtances, and from the abſence of every mark of any depravation or corruption of the humours, he infers, in a very vague manner, that the contagion of the plague muſt act upon the nerves. But nothing can more fully ſhow how inaccurate his notions upon this ſubject were, than his bringing arguments in the ſame paragraph to prove the

mor, balbuties, materiæ æruginoſæ rejectio; urinæ pallor, aliaque plura tam frequenter, cito, multipliciter, violenter in nulla vulgarium morborum ſpecie occurrunt, quemadmodum in peſte. Chenot Tract. de Peſte, p. 41.

opinion

opinion of the ancients, that the plague was a diſeaſe of the heart, and that the ſudden laſſitude, and weakneſs of the pulſe, with a ſlowneſs of it in ſome caſes, proved the great injury which that organ had ſuſtained. From theſe particulars it appears, that he was certain only of one thing, viz. that the peſtilential contagion did not act upon the blood. The ſymptoms which he relates, I ſhall endeavour to explain hereafter. The French writers ſeem to agree in referring its operation to the vital power: "Le caractere general de ce venin," ſays one of them, "c'eſt d'attaquer l'eſprit vital ou ce principe qui donne le mouvement aux reſſorts qui ſoutiennent la vie. Delà viennent que le pouls s'eteint, &c." Beſides theſe general affections, together with livid ſpots in various parts of the body, buboes and carbuncles ſoon follow, and ſeem particularly to characterize the plague. All theſe appearances are the occurrences of a few days. Death ſometimes, indeed, enſues in leſs than eight-

and-forty hours. The general ſymptoms which have been mentioned, the languor and laſſitude, the exceſſive weakneſs in all the motions of the body, and particularly conſpicuous in the functions of the heart, appear as ſuddenly, almoſt as violently perhaps, in other putrid fevers as in the plague. In the gaol-fever which happened at Oxford, perſons were attacked with the diſeaſe before they left the court of aſſize. In this, as in other putrid malignant fevers, livid ſpots, petechiæ, appear in the ſpace of a few days. If theſe are not accompanied with buboes, depoſitions on the parotid glands and other parts are not unfrequently attendant upon them. In all theſe fevers there is a ſingular diſpoſition to gangrene. In the plague the carbuncles *, we are informed, are gangrenous affections, not critical depoſitions. In other putrid fevers, gangrenous ulcers, ſeen particularly in the throat, are very frequent.

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* See Mærtens Hiſtoria Peſtis Moſcuenſis, ann. 1771.

—How then are we to explain all theſe appearances? What do the ſymptoms denote? All thoſe general ones firſt mentioned prove, that the vital power, that power, quâ fibra ad contactum irritamenti ſe contrahit, is diminiſhed in every part of the machine. It is with difficulty that the voluntary muſcles can be excited to motion; and they are feeble when brought into action. The ſick perſons can hardly walk or ſtand; ſo weak are the contractions of the muſcles of the tongue as, inſtead of diſtinct articulation, to occaſion the ſpeech to falter. That blood, which flowing into the cavities of the heart uſed to excite ſtrong and regular contractions, can now only produce weak ones. In the plague, the pulſe is in a manner extinguiſhed, as a French writer expreſſes it. In other malignant putrid fevers, it is ſometimes ſlow, more often quick. But, if the "pulſus plerumque frequens *" be a juſt part of the character of putrid fevers, muſt we not ſay, that, however the vital power may have ſuffered in the voluntary muſcles, ſo far from being impaired, it is increaſed in the heart? This would be to ſuppoſe, that what diminiſhes it in one muſcle, may increaſe it in another; this would be to make the quickneſs and frequency of its contractions the meaſure of the vital power in its fibres. He who ſhould calculate it by ſuch means, without paying any regard either to the ſtimuli applied to excite the contractions of the heart, or to the force and effect of theſe when produced, ſeems to me to be as little likely to form a juſt eſtimate of the vital power in the fibres, which perform them, as that perſon would be of having an accurate idea of the momentum or force of a moving body, who, without conſidering the quantity of the matter it contains, ſhould meaſure it merely by its velocity.—To draw right concluſions therefore from the quickneſs of the pulſe, we muſt examine the ſources from which it may ariſe. As the vital power ſeems in theſe caſes to be generally diminiſhed in the machine, it does not appear any way probable that it ſhould have ſuffered no local injury in the fibres of the heart. Inſtead of proceeding therefore from increaſed irritability, may not the quickneſs of the pulſe be occaſioned by increaſed irritation? A minute inveſtigation of this matter will, I am apt to believe, teach us, that, inſtead of being more irritable, the vital organ will only appear to have been more irritated. But, that I may not appear to make aſſertions without proofs, I ſhall endeavour to point out the ſource of this increaſed irritation; nor ſhall I have recourſe for this purpoſe to any irritating qualities combined with the ſedative ones of the poiſons which excite putrid fevers, the operation of which might be ſuppoſed to take place after the effects of the latter have ceaſed. Averſe to every thing like hypotheſis, I ſhall ſearch for the ſolution of this matter in ſuch cauſes as are evident and demonſtrable. I ſhall look for it in the mechanical increaſe of ſtimulus which takes place in theſe caſes, and which it may be eaſy to obſerve, and not difficult perhaps to explain. It is generally, I believe, admitted, that the blood flowing into the four cavities of the heart, is the ſtimulus which excites them to contract; and the effect, we ſhall find, will always be proportioned to the degree of the cauſe applied. When, at the beginning of the paroxyſm of an intermittent fever, a ſpaſm and paleneſs appear on the ſurface of the body, and the blood is ſuddenly repelled to the internal parts, the pulſe becomes during the cold fit very ſmall, extremely frequent, and often irregular. The heart ſeems for a while to labour under the load which oppreſſes it; but, the vital power in its fibres being oppreſſed, and not eſſentially impaired, this accumulation of the blood about the heart ſoon rouſes it to ſtrong and powerful contractions, by which the blood is propelled with force to the extremities, and all the ſymptoms of the hot fit, the heat and the redneſs of the ſkin, &c. enſue. As the heat comes on, the heart having freed itſelf in ſome degree, the pulſe becomes more regular, hard, and full, and in theſe reſpects increaſes until the ſweat breaks out *. As the ſweat flows, and as the circulation becomes equable in every part, and the heart is no longer ſtimulated by an unuſual quantity of blood driven back upon it, the pulſe becomes ſofter and leſs frequent. But in fevers termed putrid, the vital power being greatly diminiſhed, and the actions depending upon it conſiderably weakened, the heart is unable to rid itſelf of the blood accumulated about it, which in that unuſual quantity irritates it, as in the cold fit of an intermittent, to ſmall and very frequent contractions. In theſe caſes, inſtead of that heat and glowing redneſs of the ſkin which

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* See the Noſologia Methodica of Dr. Cullen.

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* See Dr. Cullen's Firſt Lines of Practice.

is conſpicuous after the cold fit, when the heart ſeems to have been only oppreſſed by the extraordinary load thrown upon it, the ſame ſpaſm with little or no relaxation, the ſame paleneſs continues, the ſame ghaſtly countenance is ſeen throughout the courſe of the diſeaſe, and conſequently the ſame cauſe which originally repelled the blood from the ſurface ſtill operates. But, independently of all reaſoning, the diſtention of the cavities of the heart diſcovered on diſſection, and their having burſt * in ſome inſtances, evince to a demonſtration, that the blood has been unduly accumulated about it in putrid fevers, and that the vital organ has of courſe been unuſually irritated. But the continued repulſion of the blood is not the only ſource of extraordinary irritation in theſe caſes. A reſiſtance to the motion of the heart has likewiſe been reckoned by phyſiologiſts among the cauſes which quicken

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* Vide Traité des Cauſes, &c. quoted before.

the pulſe: the obſtinate ſpaſm on the ſurface of the body, independently of the repulſion of the blood conſequent upon it, may perhaps in this way contribute to that effect. But the extraordinary heavineſs and weight of the muſcular parts in putrid diſeaſes, from the diminution of the vital principle which gives a ſpring and animation to them, muſt form a great obſtacle to the propulſive powers of the heart, and to the propagation of the motion of the blood. The blood, then, accumulated about the heart, the ſpaſm, and the increaſed weight of the muſcles giving reſiſtance to its motion, are ſources of uncommon irritation. So much, however, by ſome of the occaſional cauſes which excite malignant fevers, is the vital power deſtroyed, that the concurrence of all theſe cauſes is not in ſome caſes able to quicken the pulſe. In the plague, and in other malignant putrid fevers, phyſicians have obſerved it not only to be weak, but in many inſtances to be likewiſe ſlow. For which reaſon, the accurate Dr. Cullen, in his character of the Typhus, does not repreſent the pulſe to be always quick, but only " plerumque frequens." And when this increaſed frequency does occur, that it ariſes from the cauſes I have mentioned, is evident from this circumſtance, that if by tonic and ſtimulant medicines we can rouſe the heart to rid itſelf of the accumulated load upon it, and the abatement of the ſpaſm will admit of its being propelled in any degree to the ſurface of the body, the pulſe becomes more full and leſs frequent. But, independently of theſe ſuggeſtions, had I not been able to point out theſe ſources of uncommon irritation, the making the quickneſs of the pulſe, in ſuch caſes, the criterion of an increaſe of irritability in the heart, would involve us in the groſſeſt contradictions. Our principles in that caſe, and our practice, would be at the greateſt variance. Where the vital power is not impaired, where the vital power, or irritability as it is called, is in the ordinary ſtate of health, ſtimuli are extremely pernicious; how much more then muſt they be ſo, where that principle is increaſed? But ſo far are they from being hurtful in putrid diſeaſes, that perſons ill of them, and unaccuſtomed to wine, will not only bear, but require, a quantity of cordials which at other times would expoſe them to the moſt dangerous inflammations. To reſtore the contractions of the heart to their healthy ſtandard, we are obliged to aſſiſt its weakneſs by an increaſe of tonic ſtimuli, to excite it to a due performance of its functions. Or, to adopt the common language which has been uſed upon this occaſion, we find it neceſſary to ſupport by every poſſible means the ſinking vis vitæ, or vital power: With what propriety, then, could we refer the quickneſs of the pulſe to an increaſe of that principle which we find it ſo neceſſary to ſupport, and to keep as much as poſſible from conſtantly diminiſhing?

The late celebrated Haller, who paſſes one general ſentence of putridity upon all the exciting cauſes of putrid fevers, without appearing to alledge ſufficient proofs of it, agrees with me in regard to their primary effect on the ſyſtem, which he admits to be "ſumma virium et irritabilis naturæ deſtructio;" but then he adds, "cum ſimili ſuæ cauſæ in humoribus noſtris putredine conjuncta." It ſeems extraordinary, that ſo able a philoſopher as Haller ſhould have conceived, that the occaſional cauſes would act directly by their ſedative or weakening qualities in diminiſhing the vital principle, and that they ſhould at the ſame time operate as a ferment upon the fluids, and aſſimilate them to their own natures; ſince this would be a needleſs multiplication of cauſes, and no ways conſonant to the ſimple mode in which the wiſdom of nature uſually accompliſhes her ends. The quickneſs with which the occaſional cauſes of putrid fevers affect us, diſcountenances every idea of their acting

ing as ferments, which require time to produce a change upon our humours, and to aſſimilate our fluids to their own natures; and the notion is ſhown to be groundleſs by the proofs I have already adduced that the blood is not found after death to be ſo corrupted as it has been repreſented to be during life. Haller then agrees with me in obſerving, that the firſt effect upon our bodies of the occaſional cauſes of putrid fevers, is to deſtroy the vital power and the ſtrength of the ſyſtem. Hence then, as I have ſaid before, ariſes that difficulty, which perſons under their influence feel to uſe their muſcles, hence that averſion to motion, and weakneſs in every action. The contractions of the heart are feeble. If they are quick, it is becauſe the cauſes ſtimulating that organ are greatly increaſed. As the impaired ſtate of the vital power ſeems to offer ſo natural and ſo juſt a ſolution of the diminution of force in all the voluntary and involuntary motions, ſo it appears to me that it would be extremely unphiloſophical to have recourſe to any other cauſe, and much leſs to a viſionary putridity of the blood, to account for that flaccidity conſpicuous in all the fibres of the body, for the livid ſpots, for the tendency to gangrene, ſo remarkable in all theſe diſeaſes. They are all derived from the ſame common origin, they are all links of the ſame chain. All theſe appearances are analogous to thoſe obſerved by the celebrated Italian philoſopher, when the vital power was purpoſely and artificially deſtroyed. Weakneſs was its firſt conſequence; a ſoft, flaccid, tender ſtate of the muſcular fibres, a diminiſhed coheſion between the particles compoſing them, a lengthening of the fibres, followed in ſucceſſion, and were the immediate forerunners of putrefaction. The progreſs to putrefaction, in putrid diſeaſes, is marked by the ſame occurrences, and I therefore ſeem to be juſtified in referring them to the ſame ſource. In the ſcurvy, and in putrid fevers, a torpor, a diminiſhed diſpoſition to contract, and a diminiſhed force of contraction, are the firſt effects of their occaſional cauſes. In the former, as well as in the latter, the ſame ſoft flaccid ſtate of the muſcular fibres occurs; the ſame diminiſhed coheſion between the particles compoſing them, by which the veſſels readily ſuffer thoſe fluids, which they could before retain, to be effuſed under the ſkin, and to give the ſpots common to all theſe caſes. Hence too that aptitude to diſcharge blood by the various emunctories. The ſame lengthening of the fibres is likewiſe diſcovered. In the ſcurvy, and in the plague, the heart has been found diſtended to a large ſize. And the tendency to gangrene and putrefaction is remarkable in both theſe morbid affections. But the time in which the ſymptoms of theſe diſeaſes come on, and the quickneſs with which their ſeveral phenomena ſucceed one the other, ſeem to be proportioned in ſome degree to the violence and the ſuddenneſs with which the vital power in each complaint is diminiſhed. In the plague, that principle is greatly and quickly injured, and the livid ſpots, and the carbuncles, frequently ariſe in eight-and-forty hours. The whole diſeaſe is often the tragedy only of a few days. In other malignant fevers, in the gaol-fever, &c. the livid ſpots are ſeen the third day. In the ſcurvy, where the vital principle is ſlowly and gradually impaired, it is many weeks before the ſpots appear. As theſe ſpots follow the injury ſuſtained by the vital power, and are either quick or ſlow in their appearance, juſt as this principle is either quickly or ſlowly diminiſhed, we have as much reaſon to think them the effect of the impaired ſtate of the vital power, as to conſider the hot fit of an ague the natural conſequence of the cold fit. Does the early diſorder of the functions of the brain, in putrid fevers, ariſe from the injury of the vital power inherent in the fibres of the veſſels which go to it? or, is it not rather the effect of that quick change in the circulation conſequent on the weakneſs of the heart and arteries, by which the force and the quantity of the blood propelled to that organ are ſuddenly leſſened, and the equability of the diſtribution of the vital fluid to the different parts of it, is quickly and greatly diſturbed ? Does not the abſence of any conſiderable diſorder of the functions of the brain in the ſcurvy countenance this idea ? In this caſe, does not the gradual ſubſtraction of force from the heart and arteries, give time to the veſſels of the brain to accommodate themſelves to the change which takes place in the circulation ? When no particular diſeaſe has taken place, it is certainly owing to this cauſe, that a very conſiderable quantity of blood may be diſcharged ſlowly from the body without affecting the head : but a much leſs quantity drawn off by venæſection will often produce faintneſs.

If we conſider the appearances indicating a diſpoſition to putrefaction in a particular part, they will be found to correſpond with and to confirm what we have advanced with reſpect to the ſource of a ſimilar tendency in the general ſyſtem. Let us view the phenomena which attend the firſt decline of the vital principle (whatever it may be that impairs it) from its moſt exalted ſtate in an inflamed part, to its total extinction in a gangrene. The inflamed part firſt changes from a clear to a dark red; its fibres become ſoft and flaccid, and though before extremely irritable, they are now almoſt inſenſible to ſtimuli. The colour of the part then becomes livid, and by degrees quite black. The heat of the part ceaſes. The ſoftneſs and flaccidity of the fibres increaſe.. Their coheſion goes on diminiſhing, till they loſe their conſiſtence entirely. They at laſt exhale a cadaverous ſmell, and moulder away *. Dr. Cullen is of opinion, that the violent excitement of the inflammation gives a tendency to gan-

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* See Dr. Cullen's Firſt Lines.

grene by firſt deſtroying the tone of the veſſels, and therefore an extreme violence of pain in an inflamed part always makes us apprehenſive of it. We do not appear to know what the preciſe ſituation of the particles of a fibre with reſpect to each other is, upon which the due action of the vital power inherent in it depends, nor in what manner that particular ſtate is changed by an exceſſive inflammation. Whether the great irritation which occaſioned the inflammation exhauſts this principle, as continued ſtimuli are known to do, or whether the exceſſively increaſed action in the inflamed part deranges the ſituation of the particles of its fibres which is neceſſary to the action of the vital power, cannot be determined. It is certain, however, that gangrene is often the conſequence of ſuch an high inflammation, as well as of thoſe greatly ſedative cauſes which prevail in malignant fevers. Much, however, as theſe exciting

ing cauſes * of gangrene differ, their effects are the ſame. The ſymptoms common to all of them (the change of colour, the diminiſhed irritability from ſtimuli, the diminiſhed tone, the diminiſhed coheſion, the ſoft flaccid ſtate of the fibres, &c.) prove that the gangrenes, in both caſes, proceed from the ſame proximate cauſe in the ſyſtem, and that whether the vital power be impaired by an high inflammation, or by ſedative cauſes, the deſtruction of it is the immediate ſource in the animal œconomy, from which all the phenomena I have mentioned are derived.

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* Our ſucceſs in preventing and in ſtopping gangrenes, will always depend upon our ſagacity in diſcovering the nature of the cauſe which excites them. It will eaſily be conceived, that one occaſioned by an high inflammation, will require a very different mode of treatment from that which is brought on by ſedative cauſes and great weakneſs. Thoſe from the latter ſource are the moſt frequent in their occurrence.

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The hiſtories of ſome caſes were lately read at a meeting of the Royal Society, tending to prove that mortifications were more local affections than had commonly been imagined. Whilſt it would be difficult to conceive this truth, were they derived from any general vice of our circulating humours, the principles I have laid down will enable us to account for it. It is well known, that the vital power of a particular part may be injured, and a tendency to putrefaction in conſequence take place, and yet the circulating fluids may not be tainted. Mortification, and the loſs of a limb, has often been the effect of intenſe cold, which has no power of communicating any ſeptic principles to the maſs of the blood. With reſpect to putrid diſeaſes likewiſe, which are not confined to a particular part, but affect the whole body, though they cannot be referred to a putridity of the circulating maſs of our humours, as being that which muſt produce inſtant death, yet a diminution of the vital power, giving weakneſs, &c. and a tendency to putrefaction in the whole ſyſtem, is compatible with life, though not with health, and preſents us with the only means, as it appears to me, by which a reaſonable ſolution can be offered of the phenomena of putrid diſeaſes.

We may venture, I think, to conclude, from what has preceded, that the muſcular fibres are the ſeat of putrid diſeaſes—that the diminution of the vital power inherent in thoſe fibres is the proximate cauſe, is the general and immediate ſource in the animal œconomy, from which their ſymptoms ariſe—that the ſimilitude and affinity which has been remarked between certain appearances attending all putrid diſeaſes, (as the livid ſpots, the flaccidity of the fibres, &c.) are owing to their occupying the ſame ſeat, and to their being derived from the ſame origin in the ſyſtem—and that the peculiarities which have been obſerved to occur in the various ſpecies of thoſe diſeaſes, may probably ariſe from the different manner in which their ſeveral remote cauſes may affect the vital power, the injury of which is the immediate parent of all their ſymptoms.

I ſhall conclude this chapter with contraſting a ſlight ſketch of thoſe morbid affections which reſult from an increaſed action of the vital power, with the general character of ſuch as depend upon a diminution of it.

The former gives inflammation, which is to be diſtinguiſhed by an increaſed tone and contractility of the fibres of the body; the latter, a diſpoſition to putridity, marked by a diminiſhed tone, and a diminiſhed contractility of them. The former is accompanied with a great force of vibration in the veſſels, and an hardneſs of the pulſe; an extreme degree of weakneſs of the pulſe marks the latter conſtitution, with which ſtrength and hardneſs are wholly incompatible. The ſtate of inflammation is attended with a great increaſe of heat; the putrid tendency with very little. The former gives a glowing redneſs to the body; great paleneſs is the companion of the latter. In an inflamed condition of the body, the tenſe ſtate of its fibres is conſpicuous, and which will be eſpecially diſcernible, when the increaſed action of the vital power takes place in a particular part; in the putrid diſpoſition, the lax flaccid ſtate of the fibres is equally evident. The former is to be removed by thoſe things which leſſen the action of the vital power; the latter, it will be ſeen, is to be remedied by thoſe which increaſe it. In the former caſe, the action of the vital power is to be lowered to the ſtandard of health; in the latter, it is to be raiſed to it. In inflammation, evacuations to leſſen the quantity of the blood and humours which excite the contractions of the heart and arteries, and refrigerant medicines to abate their inordinate actions, are neceſſary; in the putrid affection, cordial and tonic medicines, to ſupport the ſinking vital power, and to reſtore the diminiſhed action of the veſſels to its uſual vigour and force of contraction, are requiſite.

CHAP. XI.

Of the Origin of the Scurvy.

IT has been matter of much diſcuſſion and controverſy, whether the ſcurvy be a diſeaſe with which the ancient phyſicians were acquainted, or whether it be the production of later times, and the offspring of certain modes of living peculiar to the preſent and a few preceding ages. The affirmative part of this queſtion, "that the ſcurvy was both known to and deſcribed by the ancients," has been maintained by the moſt diſtinguiſhed perſons for their learning, from Sennertus to Dr. Mead. The authority of Dr. Friend ſeems to be the chief ſupport of the negative ſide of this argument. So much and ſo ably has this diſpute been handled, that I could have wiſhed not to have entered upon a part of my ſubject, in which I ſhall frequently be involved in the unavoidable repetition of what others have ſaid; but it ſeems to be highly improper to decline touching upon it in this place, becauſe it may be of conſequence to the doctrine I have advanced, to prove, that, as ſome of the cauſes to which I have referred the ſcurvy are ſuch as may at times prevail in almoſt every country; ſo, in fact, it has, at ſome period or other, been found to exiſt in moſt parts of the globe. In the examination of this matter, I ſhall not barely conſider the words of the ancient phyſicians, which have been underſtood to relate to this complaint, but I ſhall enquire, whether the diſeaſes, the deſcriptions of which have been thought to agree with thoſe of the ſcurvy, were obſerved to ariſe from thoſe cauſes which are known at preſent to occaſion this malady.

In the Græcian, in the Arabian, and in the Roman authors, we ſhall find many accounts and paſſages, which cannot be deemed to refer to any other complaint, than to that of which we are ſpeaking. Hippocrates deſcribes the σπλην μεγας in the following manner: "Alius lienis morbus ab iiſdem quidem ex quibus et prior oritur eoque modo hoc morbo afficitur. Venter inflatur, poſteâ vero lien intumeſcit, durus eſt eique dolores acuti contingunt: color immutatur et niger cernitur, ſub-pallidus et qui malicorium formâ referat, et aure et gingivis gravis odor exhalat eæque a dentibus diſceſſionem faciunt, et in tibiis ulcera qualia puſtulæ nocturnæ erumpunt, membra extenuantur neque ſtercus per alvum demittitur [*]." Similar ſymptoms are, in other parts of the works of Hippocrates, ſaid to follow like affections of the ſpleen [‡].—The ſame obſervations have likewiſe been made by other writers. Paulus Ægineta remarks, "Hoc preſſis vitio (ſchirrho lienis) os fætet, gingivæ exeduntur, ulcera in cruribus cicatricem non recipiunt." The terms in which Avicenna ſpeaks of this diſeaſe, have ſome marks which ſeem to ſhew that he did not ſervilely borrow or copy his account of it from others: "Et quandoque denigratur lingua eâ duritie ſplenis, et ſentitur durities ejus abſque rugitu cum premitur, niſi aggregetur ei inflatio, et non eſt cum eâ febris inſeparabilis, imo aliquando eſt non ſecundum ordinem: et quandoque multiplicantur cum ea ulcera crurum, et corroduntur dentes, ac gingivæ propter groſſitudinem ſanguinis, qui deſcendit in ulcera crurum, et corruptionem vaporis qui deſcendit in omnes partes gingivarum, et quandoque eſt in ulceribus crurum criſis ejus." The conſtitutions in which this diſeaſe, called by the ancients σπλην μεγας, was obſerved to occur, were thoſe which had been weakened by preceding diſeaſes, by obſtinate and ill-cured fevers, or in atrabiliary habits. It was ſaid, likewiſe, to ariſe in cold weather from drinking impure waters. The atrabiliary habit, and weakneſs after fevers, are at this time obſerved to contribute to the production of the ſcurvy, and ſeem to afford a preſumption, that the diſeaſe, called the σπλην μεγας by the phyſicians which have been quoted, was no other than the ſcurvy.

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[*] V. Lib. Hipp. de internis Affect.

[‡] V. Hipp. Oper. Lib. ii. Prædict.

The deſcription, however, of the Convolvulus ſanguineus * is ſtill more agreeable to that of the ſcurvy, than that even of the σπλην μεγας. One attacked with that diſeaſe is ſaid by Hippocrates to be attended with the following ſymptoms: "Ex ore malus odor expirat, a dentibus gingivæ abſcedunt et ex naribus ſanguis effluit. Interdum vero ex cruribus ulcera erumpunt. Et hæc quidem ſaneſcunt—alia vero exori-

* Εἰλεὸς αἱματίτης.

untur. Color niger eſt et cutis tenuis. Ad deambulationem et ad laborem (haud) promptus eſt." After the example of Haller, I have taken the liberty to add the negative "haud" to this deſcription; ſince moſt writers have conſidered the omiſſion of the negative ȣ in the Greek text as an accidental corruption of it. For, whatever the diſeaſe here deſcribed may be deemed, it is inconſiſtent with common ſenſe to ſuppoſe, that they who had ulcers, &c. in their legs, could be alert to labour and exerciſe; which would be the ſenſe of the paſſage, if the negative article be not reſtored. But a part of the text itſelf proves that Hippocrates could not mean to ſay, that perſons afflicted with the Convolvulus ſanguineus, were ad deambulationem et ad laborem prompti; ſince he ſays, cætera quidem copia eadem ac prioribus contingunt. Of the perſons mentioned in the preceding paſſage, as labouring under the firſt ſpecies of the Convolvulus, it is

ſaid, Ejus autem crura gravantur, et ſi deambulet tremunt, et ſi per acclivem locum iter faciat crebro admodum ſpirat et ulnæ ſuſpenſæ eſſe videntur, &c.

Stating the paſſage in this manner, it muſt be allowed by every one to be a perfect deſcription of the ſcurvy, excepting that the ſpots, frequently incident to this diſeaſe, are not mentioned. But, if the ſpots be not the term made uſe of, the diſcoloration of the ſkin is conſtantly noticed. In this place it is ſaid, color niger eſt, cutis tenuis: when Hippocrates ſpeaks of the σπλην μεγας, it is ſaid, color autem immutatur et niger cernitur, ſubpallidus, &c. In like manner Sennertus, one of the beſt writers on the ſcurvy, obſerves, "In aliquibus nullæ erumpunt maculæ; aliis tota crura colore violaceo pinguntur ut tibi alia ejus coloris ſuper-inducta jurares." The deſcription of Hippocrates is perfectly agreeable to the laſt inſtance of the ſcurvy mentioned by Sennertus.

When I conſider the mildneſs of the climate in which the works of Hippocrates were compoſed, and the conſequent rare occurrence of this diſeaſe, both from that circumſtance as well as from the impoſſibility of long voyages by means of the ignorance of navigation in thoſe times; when I recollect too the general inaccuracy (reſulting from the ſtate of phyſic at that period) in the characters of diſeaſes much more familiar to the ancients than the ſcurvy could poſſibly have been; I profeſs, I am more ſtruck with ſurprize at the deſcription being ſo perfect, than diſpoſed to cavil with its trifling defects. — If from the deſcription we turn to the conſideration of the generic cauſe of the various kinds of Convolvuli, our doubts of its being ſcurvy which is here meant to be delineated, muſt be ſtill more leſſened. It was an heating food, taken by perſons uſing little or no exerciſe, and who, thus weakened, were ſuddenly forced to undertake long and fatiguing journies in very cold weather. Convolvuli appellantur hi morbi ex hiſque præcipue oriuntur. Si quis calidâ et humidâ victûs ratione per hyemem utatur neque ciborum ratione factâ obambulationibus ſe exerceat; verum expletus dormiat, deinde derepente longum iter per frigus conficere cogatur. The name given to it in this place, is equally corroborative of my opinion with the generic cauſe aſſigned. The Ειλεος is a term not confined by the ancients to expreſs affections of the ſmaller inteſtines, but applied to denote pains in the other parts of the abdomen likewiſe. The modern term Schorbock, or Schorbuck, in the Saxon language, ſignifies nothing more than pains of the bowels. Dr. Mead, de Scorbuto, ſays, Tormina quoque ventrem diſcruciant. Et ne levia quidem prætermittam, ab inteſtinorum doloribus nomen ſuum tum Latinum tum Anglicum traxiſſe videtur iſte affectus a voce nimirum Saxonicâ Scherbock vel Schorbuck quæ illâ linguâ ventris lacerationes denotat.

The deſcription then, the generic cauſe, the name of the diſeaſe, in this laſt inſtance, all lead to the ſame concluſion.

But if the diſeaſes mentioned by the ancients under the names of the Splen magnus, and the Convolvulus ſanguineus, &c. be not the ſcurvy, it would be difficult, I believe, to ſay, to what other complaint the deſcriptions of them are applicable. That they were real pictures drawn from nature, and not ſet down by whim or fancy, I believe no one will deny. Let us ſuppoſe a modern phyſician called to a perſon labouring under the ſymptoms aſcribed to the Convolvulus ſanguineus. Let us ſuppoſe that he found his patient with a moſt offenſive breath, the gums receding from the teeth, and theſe left bare, accompanied with frequent hæmorrhages from the noſe, and little foul ulcers in the legs, with a dark diſcoloured ſkin, and withal a great degree of general debility. A phyſician would probably enquire into the circumſtances of the perſon's mode of living, previous to this illneſs; the patient would tell him, that he had lived for a conſiderable time on a very heating diet, indulging always in the greateſt indolence, and that in this weak enervated ſtate, having been obliged to undertake a long fatiguing journey, much beyond his ſtrength, in extremely cold weather, he had been attacked with the ſymptoms which have been mentioned. I believe there is hardly a phyſician who, under theſe circumſtances, would heſitate to pronounce his diſeaſe to be the ſcurvy.

Strabo informs us, that the Roman army ſent into Arabia, under Ælius Gallus, in the reign of Auguſtus, underwent great hardſhips and fatigue from difficult marches, at ſome times in a marſhy unhealthy country, and at other times from long and troubleſome navigations, which Syllæus purpoſely protracted. "Proinde," ſays he, "ad album pagum pervenit, jam exercitu oris et crurum vitiis (qui morbi ſunt ei regioni peculiares) tacto Stomacaccen et Sceletyrben dicunt: quorum illa circa os et circa crura reſolutio quædam eſt ex aquis et herbis proveniens *." As the ſcurvy in Italy aroſe from a ſcarcity of corn and proviſions, and from the inhabitants being reduced to live on a decoction of vegetable roots, it is reaſonable to ſuppoſe that the ſame effects muſt follow from the ſame cauſes among other people, and that in the Roman army it was produced, as it has been among others, not by any peculiar quality of the herbs which were eaten, but from the ſmall and inſufficient nouriſhment which theſe afforded. In the particular caſe of the Romans, which we have mentioned, this is not the mere inference of reaſon. We have the expreſs aſſurance of the hiſtorian, that the Roman army had been purpoſely and treacherouſly expoſed to hardſhips, and almoſt famine, by Syllæus: Nam nec tutum iter, ſays he, nec expeditam navigationem monſtravit ſed per avia et longos anfractus et loca

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* Vide Strabonis, lib. 16, p. 1127.

omnium *indiga* et importuoſa dorſa vel occultis cautibus aut cænoſis ſtagnis periculoſa duxit. We are moreover aſſured that Syllæus had premeditated their deſtruction, and wiſhed to accompliſh it by fatigue and famine. Is (ſcil. Syllæus) omnia dolo agebat, cupiens ut opinor regionem perluſtrare et Romanis in urbibus aliquot ac gentibus ſubigendis adeſſe, deinde his abſumptis morbo, fame ‡, labore, et aliis quæ ſtruxerat malis ipſe univerſa ea poſſidere. It was under circumſtances ſomewhat ſimilar, that the diſeaſe aroſe, which afflicted the Chriſtian army in

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‡ Τȣτȣ (Συλλαίȣ) δ' ἅπαντα δόλω στρατηγοῦντος, καὶ ζητουντος (ὡς οἶμαι) κατοπτευσαι μεν την χωραν, καὶ συνεξελεῖν τινας αὐτῶν πόλεις καὶ ἔθνη μετα των Ρωμαιων, αὐτὸν δὲ καταστῆναι κύριον απαντων, αφανισθεντων εκείνων ὑπὸ λιμȣ̃ καὶ κόπȣ, καὶ νοσων καὶ ἄλλων ὃσα δόλω παρεσκευασεν ἐκεῖνος· εις γȣν την λευκὴν κωμην κατῆρεν, ἤδη στομακάκκη τὲ καὶ σκελοτυρβη πειραζομένης της στρατεῖας επιχωρίοις παθεσι, των μεν περι το στομα, των δὲ περι τα σκελη παραλυσίν τινα δηλοῦντων, εκ τε των υδρειων, καὶ των Βοτανων.

Egypt, under St. Louis, in 1260. They had great difficulty to ſubſiſt themſelves. They had but one ſort of fiſh, and their religion would not ſuffer them to eat meat during Lent *. That circumſtance, together with the bad air, and the great ſcarcity of water,

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* Nous ne mangions nulz poiſſons en l'oſt tout le quareſme mez que bourbetes, et les bourbetes manjoient les gens mors, pource que ce ſont glous poiſſons: et pour ce meſchief et pour l'enfermeté du pays, là ou il ne pleut nulle foiz goute d'yaue, nous vint la maladie de l'oſt, qui eſtoit tele que la char de nos jambes ſechoit toute et le cuir de nos jambes devenoient tavelès de noir et de terre, auſſi comme une vielz heuſe; et a nous qui avions tele maladie venoit char pourrie 'es gencives, ne nulz eſchapoit de cette maladie que mourir ne l'en convenist. La ſigne de la mort eſtoit tel que là ou le nez ſeignoit, il convenoit mourir.—The arrival of Eaſter did not put an end to the calamities of this army. For the dearneſs of proviſions precluded them in a great meaſure from the plentiful uſe of that food which their condition ſo much required. Joinville informs us, that an ox ſold for eighty livres, an hog for thirty, an egg for twelve deniers, an hogſhead of wine for ten livres; all very great prices for thoſe times.

gave them a moſt virulent ſcurvy, which is characterized in the moſt particular manner by the Sieur Joinville, who is unanimouſly admitted by every one to have given a perfect deſcription of the diſeaſe. It is therefore ſomewhat extraordinary, that a man of Dr. Friend's erudition, ſhould conſider the ſcurvy as a new diſeaſe, and the offspring of the fifteenth century, and that he ſhould venture to differ from ſo many of his learned predeceſſors in the profeſſion, merely on the authority of ſuch a writer as Fabricius, (for he gives no other reaſon); who tells us, in his Antiquities of his own country, Miſnia, that in 1486 this new and unheard-of diſeaſe ſpread itſelf very much, and not only proved extremely dangerous, but carried contagion with it *. The words of Fabricius are, "graſſatus eſt hoc anno novus et

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* See Dr. Friend's Hiſtory of Phyſic, vol. II. page 387.

inauditus in his terris morbus †." This then is only to ſay, that it was a new and unheard-of diſeaſe in Miſnia. But if Fabricius and others had not till this time any knowledge of the ſcurvy, either from books or from experience, it only proves their ignorance of Joinville's hiſtory of St. Louis, of Strabo, and of the Arabian as well as the Græcian writers. It is indeed no ways extraordinary that they ſhould be unacquainted with the works of ſuch authors; ſince learning was but juſt then beginning to revive; and Dr. Friend himſelf admits, that very few had conſulted the works of the ancient Greek and Arabian phyſicians, till the end of the fifteenth century. It is no objection to the point I wiſh to eſtabliſh, that the ancients, to whom, for the reaſons which have been given, the ſcurvy muſt have been much leſs familiar than to us, ſhould have called it by different names, the Splen magnus, the Convolvulus ſanguineus, the Stomacace, &c. and perhaps have conſidered the complaints ſo denominated as different diſeaſes. Modern writers have given it various appellations, according to the particular ſymptom which ſtruck them as predominant. The Danes have called it Scorbect, from the gums and teeth being affected. The Saxons, Scorboct, from the pains in the bowels which attend this diſeaſe. But the difference of the name does not alter the nature of the complaint; and though moſt of the northern nations had peculiar terms for it, they doubtleſs meant to denote one and the ſame thing by all of them. The diſeaſe deſcribed by Joinville, is not leſs the ſcurvy for not being called by that name. The term Scurvy, which is now prevalent, was thought ſo barbarous, that after it had been applied to this diſeaſe, and the word Scorbutus added to the Latin language, Ronſeus and others declined to uſe it, and entitled their books, written profeſſedly on the ſcurvy, "De magnis Lienibus Hippocratis et Plinii Stomacace, ſeu ſic dicto Scorbuto, et Sceletyrbe." It ſeems, therefore, that I may be juſtified in concluding that the ancients were acquainted with the ſcurvy. They obſerved its connection with thoſe conſtitutions to which it is known at this time to be related. They teach us that the atrabiliary habit, and weakneſs from long and ill-cured fevers, gave people a prediſpoſition to the Splen magnus, and that crude cold waters contributed likewiſe to the ſame diſeaſe. The expoſure of perſons who had lived in habits of indolence, to great and ſudden fatigue in cold weather, inclined perſons to the various ſpecies of the Convolvuli. Great fatigue, with a want of ſufficient ſuſtenance, occaſioned the Stomacace and the Sceletyrbe in the Roman army. The ſame circumſtances, together with a moiſt impure air, involved the French army under St. Louis in the ſame calamities. As the deſcriptions of the diſeaſes in all theſe caſes, and the cauſes which produced them, correſpond very much with the known character of the ſcurvy, and with the ſources from which it is now obſerved to ariſe, I cannot but believe that the diſeaſes delineated by the ancient writers, in the paſſages which have been quoted, were no other than that now known by the general appellation of the ſcurvy.

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† Vide Tractatum Johannis A Bona de Scorbuto. He diſcuſſes this ſubject with great erudition.

CHAP. XII.

Of the Cure of the Scurvy and putrid Fevers.

THERE are ſurely few diſeaſes which have ſo many and ſuch excellent remedies as the Scurvy; and it has been obſerved, with good reaſon, that there is ſcarcely any complaint in which the tranſition from the moſt deplorable ſtate to that of health, is frequently ſo ſudden, and often ſeemingly brought about by the moſt trifling means. I ſhall briefly mention, not only the medicines which have been moſt approved in this diſorder, but the means which have been found efficacious in the removal of it without their aſſiſtance; and I ſhall ſubjoin ſome obſervations on the mode in which, I conceive, the health, in both caſes, may have been reſtored.

Fruits, and thoſe vegetables called Herbæ, are eſpecially beneficial. Of the former, the orange and the lemon are of particular efficacy; but their juices ſhould be diluted with warm water or gruel, or, which would be ſtill better, four ounces of theſe juices ſhould be added to a pint of wine, with two ounces of ſugar. This, the experienced Dr. Lind eſteems the moſt efficacious remedy for this diſeaſe, and greatly to exceed the ſimple lemon-juice, or any other method in which it can be given. This mixture, he acquaints us, proves greatly diuretic, and ſometimes occaſions profuſe ſweats.

Among the vegetables, though all thoſe of the ſucculent kind, as the ſpinage, common greens, &c. are extremely ſerviceable, yet the ſcurvy-graſs and the water-creſſes are particularly eminent for their virtues. All the aromatic, as well as the alcaleſcent plants, have received an high and a juſt degree of praiſe in theſe caſes. The juice of the cocoa-nut tree, which diſtills from inciſions made in the branches and tops of it, has been known to produce effects equal to any medicine. The Peruvian bark, too, is ſpoken of by many authors as being of remarkable uſe in ſome caſes of the ſcurvy. Hoffman ſpeaks in high terms of the mineral waters as excellent remedies for it. Among others, he praiſes the Caroline and the Seltzer waters; but he thinks the mineral waters are more efficacious when they partake of the chalybeate principle, as the waters of the Lanchſtadt ſpring near Hall. The happy diſcoveries of Dr. Prieſtley have taught us a method by which this remedy, ſo much applauded by Hoffman, may be within the reach of every veſſel. The mode of ſweetening ſalt-water by diſtillation is, I ſuppoſe, known to every commander. If ſuch water ſhould prove vapid and unpalatable, fixed air would not only help to correct ſuch a taſte, and be a beneficial addition on account of its active ſtimulant properties; but it might be of further ſervice, by putting it in our power to conform ſtill more to Hoffman's advice, and, by the addition of ſome ſteel-filings, which fixed air would enable the water to diſſolve, to bring our medicine ſtill nearer to the nature of the Lanchſtadt ſpring.

But though the greateſt merit cannot be refuſed to the medicines which have been mentioned, there are other, and ſeemingly trifling means, by which a recovery from this diſeaſe has been frequently effected. The change of the ſituation of ſeamen from the moiſture of a ſhip to a pure air and a dry tent on ſhore, has produced a wonderful amendment. Freſh fleſh-broths have often worked a perfect cure. On the 30th of January, 1744, Mr. Ives informs us, that he had near ſeventy perſons ill of the ſcurvy in the Mediterranean; yet the joy of approaching the enemy's fleet, and the hope of beating them, had ſuch an effect, that on the 11th of February following, when the engagement happened, there were not above five but what were at their fighting quarters. They had had but five ſervings or meſſes of broth during this time; and Dr. Lind ſeems, with reaſon, to conſider this ſudden and wonderful change, rather as an inſtance of the effect of the paſſions of the mind in this diſeaſe, than as the conſequence of the very trifling aſſiſtance they could have derived from their broths. The ſame reſpectable author, in the Poſtſcript to his Book on the Scurvy, gives us the ſum of his experience during a long period; in which he had, perhaps, the beſt opportunities of making obſervations which ever occurred to any individual. As I ſhall make ſome inferences from what he delivers, I chuſe to ſtate the premiſes, from which I ſhall draw my concluſions, in his own words. "I have made it my ſtudy, ſays Dr. Lind, for ſome years, with unwearied diligence, to obſerve the effects of all the medicines and methods of cure which have been recommended for this diſeaſe, by putting them to the faireſt trial. For this purpoſe, I not only ſent abroad various medicines to be adminiſtered to patients by way of experiment at ſea, but have at different times ſelected a number of patients in Haſlar hoſpital, and adminiſtered to them, in various forms, all the different anti-ſcorbutic remedies; the principal of which were, the ſcorbutic juices of the London Diſpenſatory; the juice of the ſcurvy-graſs by itſelf; the Peruvian bark in large quantities; the decoction of the guaiacum and ſaſſafras; infuſions of juniper-berries; and ſtomachic bitters of various kinds; both the decoction and juices of the fir-tops, the pines, &c. In order to judge of the effects of each of theſe medicines, the patients ſelected to uſe them were confined in wards by themſelves; they were ſtrictly watched, and debarred from eating any green vegetables, fruits, or roots whatever, though many of them had not taſted any thing of that ſort for ſeveral months: they were not permitted even to taſte the hoſpital broth. Their breakfaſt was balm-tea, with bread and butter; for dinner they had light pudding; and for ſupper, water-gruel, with bread and butter. Upon a daily compariſon of all theſe patients, I was ſurpriſed to find them all recovering pretty much alike; and though they abſtained altogether from vegetables, yet they in general grew better. I have alſo endeavoured to diſcover the comparative effects of different fruits and vegetables in this diſeaſe. For this purpoſe, after reſtraining the patients from all other vegetables or medicines, I gave to ſome ſalads of water-creſſes and ſcurvy-graſs; to others, garden-creſſes, endive, dandelion, and lettuce; and to others, ripe fruits, as plums, apples, currants, &c.; but could not obſerve a ſuperior anti-ſcorbutic virtue in any of thoſe, as the patients who eat them did not recover ſooner than thoſe who had daily given them the hoſpital broth, with boiled beef and greens." What are the concluſions which may be drawn from theſe facts? One who is not diſpoſed to arrogate a greater merit to phyſic than is due to it, would be apt to ſay with Dr. Lind, that the ſcurvy preſents a wonderful inſtance of the quick diminution of the effect from the ceſſation of the cauſe; and that, as this diſeaſe is brought on by the moiſture, &c. on board ſhip, and an indigeſtible diet; ſo, on the removal of theſe cauſes, on ſailors being put into dry beds on ſhore, and fed with a light nouriſhing diet, the miſchievous conſequences of this diſeaſe ſoon diſappear. All thoſe means of cure which have been enumerated, may however be reduced to the following heads: to the nutrientia, ſudorifica, diuretica, ſtimulantia, and the tonica. The firſt of theſe act upon the ſimple ſolid. By repairing the neceſſary and daily waſte of the machine, which could not be replaced by an indigeſtible diet or inſufficient food, nouriſhment reſtores that ſtate to the fibre which is requiſite to the due action of the vital power. By giving that degree of plethora which is neceſſary to promote the various ſecretions and excretions of the body, it prevents that principle from being weakened by the retention of impure matters, the evacuation of which leaves it in a condition capable of properly exerciſing its functions. This is the manner in which I conceive the freſh fleſh-broths ſimply, the broths of the Haſlar hoſpital, and the boiled beef and greens, have rendered the benefit which has been obſerved to follow, ſometimes their ſeparate, and at others their joint uſe. The acid juices of fruits, of the lemons and the oranges, are great promoters of perſpiration and of urine. Their virtues in the cure of this diſeaſe were improved by dilution with water-gruel, which cannot well be conceived to operate otherwiſe than by giving that fullneſs to the veſſels which might render the effect of the acids, as ſudorifics and diuretics, more certain. But where the diſeaſe was a good deal advanced, and great weakneſs had taken place, a pint of rich Malaga wine, joined with four ounces of theſe acid juices, by its ſtimulant cordial properties added great efficacy to theſe, which was ſtill further increaſed by the addition of a quantity of ſugar, ſo as to occaſion a ſort of effervеſcence at the time of taking this mixture. That the wine, and the active ſpirit diſcharged by this effervеſcence, are uſeful, by their cordial and ſtimulant qualities, and by concurring with the acids in gently promoting the proper excretions of the ſkin, and the kidneys, ſeems evident from the happy preſage always drawn in this diſeaſe, when the ſkin, from having been dry, becomes ſoft and moiſt. Dr. Lind moreover informs us, that the effects of this cordial mixture actually were ſudorific and diuretic. This view of the ſubject affords us ſome means of accounting for the beneficial effects aſcribed to the mineral waters in the ſcurvy. In conſequence of the conſiderable quantity of fixed air they contain, they are ſtimulant and diuretic. With theſe virtues, the Seltzer waters, though the moſt putreſcent of the mineral waters, are recommended by Hoffman in this complaint. The ſcurvy-graſs, the water-creſſes, are endowed with peculiarly acrid ſtimulating juices, the operation of which is probably heightened by the volatile elaſtic principle which they diſcharge. Kramer, at a time when fixed air was not ſo faſhionable a topic of praiſe as it is at preſent, and before it was known to be the matter diſcharged by vegetables in their fermentations, obſerved, that in a thouſand patients he had cured of the ſcurvy by the juices of the ſcurvy-graſs and creſſes, each doſe of the juices occaſioned prodigious belchings and wind. It was ſo uncommon, that he ſays, he imagined it proceeded from the " volatile and active ſalts of theſe plants, ſet looſe in the ſtomach. I agree perfectly with an ingenious gentleman *, who aſſerts, that the good effects of the alcaleſcent and aromatic plants in the cure of the ſcurvy, cannot ariſe from their antiſeptic qualities, as thoſe plants yield an exceedingly ſmall portion of the vinous or acetous principle, and many of them ſo very little, as ſcarcely to be diſcovered by any proceſs whatever. Their effects ſeem with reaſon to be aſcribed to thoſe penetrating, warming, diuretic and ſudorific qualities, by which they promote a free perſpiration from the ſurface of the body, and a copious diſcharge of urine. It is by the ſame properties, I conceive, that a clove of garlick taken of a morning, has proved an excellent preſervative againſt the attack of this diſeaſe. Theſe warming, penetrating ſubſtances are by their ſtimuli in effect tonic: like the bark, they

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* See Dr. Wilſon's Obſervations relative to the influence of climate on vegetable and animal bodies, page 206.

brace the fibres in ſome degree, and reſtore a proper degree of force to the contractions of the veſſels. The means then, and the medicines made uſe of for the cure of the ſcurvy, ſeem to add confirmation to the doctrine I have advanced reſpecting it. They conſiſt in ſuch things as act upon the ſimple ſolid, as nouriſhment: and in ſuch medicines as operate upon the moving fibres, as ſudorific, diuretic, ſtimulant, or tonic remedies.

But a very different interpretation has been put upon the mode in which theſe medicines operate. The ſcurvy having been ſuppoſed to conſiſt in a putridity of the blood, the means found uſeful in the cure of it have been ſaid to act upon its mixture, and to produce their good effects by changing the corrupt ſtate of our fluids into a ſound one. It has been in virtue of their antiſeptic qualities, that the various ſubſtances which have been mentioned, have been conceived to render ſervice. Much, however, as people of late years have been attached to the doctrine of antiſeptics, I truſt there is hardly any one who would venture ſo ridiculous an idea, as to ſpeak of freſh fleſh-broths under that title, or who would aſcribe their good effects to ſuch an operation. The benefits derived from garlick, from the aromatic and the alcaleſcent plants, ſeem to be as little explicable in that way. The moſt faithful obſervations on this diſeaſe teach us, that the acids, the wine, &c. do in fact operate by perſpiration and by urine. To ſpeak of an evacuant as an antiſeptic, ſeems to be a ſoleciſm in language. A perſon might with equal propriety talk of an antiſeptic emetic or purgative, as of an antiſeptic ſudorific or diuretic. In ſo far as any of theſe claſſes of medicines promote the diſcharge, by the emunctories, of thoſe parts of the body which are conſtantly and neceſſarily degenerating into corruption, and which, if accumulated in the body, might be prejudicial in the manner which has been explained; or in ſo far as any of theſe remedies, by a tonic effect on the moving fibre, prevent a general tendency in the ſyſtem to putridity, they may be entitled to the name of antiſeptics, and certainly do effectually guard the body from putrefaction. But this does not ſeem to come up to the idea which has been inculcated reſpecting antiſeptics. This term has been applied to ſuch matters as have been ſaid to have a power, not only of retarding or preventing putrefaction in animal ſubſtances, but of changing them, when corrupted, into a ſound ſtate; and their operation upon things out of the body, has been given as a criterion by which we are to judge of the properties they will exert within it. But this is a rule which, I profeſs, does not appear to me to be either founded in reaſon, or to be warranted by experience. The only ſecurity which we have againſt the effects of putrid matters, ſeems to depend upon guarding the body againſt the admiſſion of thoſe which threaten us externally, or in procuring the diſcharge of ſuch as may have been generated within the body, or may by any accident have been received into it. It is with the greateſt diffidence that, againſt the authorities which have maintained the contrary, I preſume to ſuggeſt a doubt whether the moſt powerful antiſeptics be able to hinder the generation of putridity in the body, or whether they be capable of changing any corrupt matters within it into a ſound ſtate. If theſe ſuſpicions ſhould appear to be well founded, then ſurely the doctrine of antiſeptics will reſt upon a very precarious foundation, and the labour which has of late years been devoted to aſcertain the antiſeptic qualities of every drug which has attracted our notice, may perhaps be thought to have been placed on things leſs worthy of the attention and induſtry of phyſicians, than many objects which they might otherwiſe have purſued.

To juſtify the doubts I have thrown out, I ſhall here beg leave to enter into a ſhort relation of the experiments upon which Sir J. Pringle founded his doctrine of antiſeptics, and I ſhall endeavour to point out thoſe, in my opinion, haſty inferences, by which they were attempted to be made guides to us in the prevention and in the cure of putrid diſeaſes.

Sir J. Pringle *, by experiments made on the fleſh, and on the fluids of animals, found that there were many ſubſtances in nature which had a power not only of preſerving them from putrefaction, but of reſtoring them to a firm ſound ſtate when corrupted. Theſe ſubſtances are called antiſeptics. A piece of fleſh ſtrewed with the ſalt of hartſhorn powdered, being kept a twelvemonth, remained untainted, and as firm as at firſt. Another piece of fleſh, that had become ſoft, ſpongy, and putrid, was thrown into a few ounces of an infuſion of camomile-flowers, and, the liquor being renewed

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* See the Appendix to his Works.

two or three times in as many days, the fleſh loſt its fœtor, and, being put into a clean phial with a freſh infuſion, was found at the end of a twelvemonth firm and uncorrupted. The claſs of antiſeptics is now become one of the moſt extenſive in the whole materia medica; and, what perhaps may ſeem extraordinary, things the moſt oppoſite in their natures agree in poſſeſſing an antiſeptic power. Acids, alkalis both fixed and volatile, neutral ſalts, earthy and metallic ſalts, eſſential and empyreumatic oils, vegetables of moſt kinds, are all endued with antiſeptic qualities; the degree, however, of antiſeptic power varies in different ſubſtances. The comparative antiſeptic powers of theſe various matters, Sir J. Pringle has endeavoured to aſcertain with wonderful accuracy and induſtry. His firſt object was to procure a ſtandard, to which he might refer the antiſeptic powers in different matters. This he made of common ſalt, a ſlight reſiſter of putrefaction, according

ing to the learned gentleman. I ſhall beg leave to copy this experiment, as it may elucidate any further inveſtigation into this ſubject.—Three pieces of the lean of freſh beef, each weighing two drachms, were put ſeparately into wide-mouthed phials, two ounces of ciſtern-water were added to each; in one, was diſſolved thirty grains of common ſea-ſalt; in another, ſixty; but the third contained nothing but fleſh and water. Theſe phials were little more than half full, and being corked, were placed in a lamp furnace, regulated by a thermometer, and kept to the degree of the human body. In about ten or twelve hours after, the contents of the phial without ſalt had a faint ſmell, and in two or three more became putrid. In an hour or two longer, the fleſh with the leaſt ſalt was tainted; but that which had moſt, remained ſweet about thirty hours after infuſion. The uſe of this experiment was to judge of the ſeptic or antiſeptic ſtrength of bodies. Thus, if water with any ingredient preſerved fleſh better than without it, or better than with the addition of ſalt, that ingredient might be ſaid to reſiſt putrefaction more than water alone, or water with thirty or ſixty grains of ſea-ſalt. But if, on the other hand, water with any addition brought on corruption faſter than when pure, the ſubſtance added was to be reckoned a promoter of putrefaction. Of all the ſubſtances which have been compared with this ſtandard, camphire ſeems to be the moſt powerful; it is three hundred times more antiſeptic than common ſalt. Camomile-flowers and Virginia ſnake-root are only one hundred and twenty times more antiſeptic than the ſtandard. The Peruvian bark, though ſomewhat inferior to the two laſt, has a conſiderable antiſeptic power. Beſides theſe, pepper, ginger, ſaffron, contrayerva-root, galls, dried ſage, rhubarb, the root of the wild valerian, the leaves of mint, angelica, ground-ivy, ſena, green tea, and red-roſes, are to be reckoned among the powerful reſiſters of putrefaction. I could add ſome hundred articles to this liſt of antiſeptics: but, to compleat the catalogue, I muſt refer the reader to ſuch books as treat ſpecifically of them *. I muſt add, however, that I have no doubt but that the experiments which have been mentioned were carefully made, and that they are faithfully related. It is not their accuracy which I ſhall venture to impeach. It is their application, and the concluſions from them, which I ſhall preſume to queſtion. I cannot bring myſelf to think, that the furnace or crucible of a chymiſt affords a fair criterion by which we are to judge of the nature of a medicine, or that the change which it produces on the dead fibre, is to be a rule by which we are to eſtimate the probable effects of it on the animated machine. Becauſe the volatile and fixed alkaline ſalts preſerve dead ſubſtances from putrefaction

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* V. Traité pour ſervir à l'Hiſtoire de la Putrefaction.

in the furnace, are we juſtified in making the inference which Sir J. Pringle has done, and upon which all this ſyſtem hinges, that neither the volatile nor fixed alkaline ſalts tend naturally to promote putrefaction "within the body?" Had it been obſerved that their effects on the living body were antiſeptic, his experiments might have been deemed a ſatisfactory explanation of their operation. It is our duty firſt to aſcertain facts from experience before we attempt to account for them. An appeal to that tribunal will, I believe, not be very favourable to the ſyſtem of which we are ſpeaking.

It muſt ſurely ſtrike every unprejudiced mind with ſurprize, that, with a liſt of ſuch powerful antiſeptics as that we now poſſeſs, the idea of a putrid diſeaſe ſhould ſtill be matter of ſo much alarm. It muſt appear extraordinary, that whilſt we are daily making conſiderable additions to the catalogue of thoſe ſubſtances which have a power of preſerving the dead fibres of animals from putrefaction, the liſt of our remedies againſt putrid diſeaſes ſhould be daily diminiſhing; I ſhould have conceived, that this very circumſtance would have led people to ſuſpect, that experiments upon ſubſtances out of the body, do not afford any very certain criterion of the nature or operation of them within it. It will be ſaid, perhaps, that we have occaſion only for the moſt powerful antiſeptics; and that, the application of the ſtronger precluding the uſe of the weaker, will account for the ſmall number of medicines which we exhibit in theſe complaints. Were this the caſe, it ſurely would be a ſufficient anſwer to the objection: but, unfortunately for the ſolution, the fact is quite otherwiſe. When we deſcend to particulars, we ſhall find that the weaker antiſeptic is frequently a more powerful remedy againſt putrid diſeaſes than the ſtronger antiſeptic and that a medicine poſſeſſing very little or no antiſeptic qualities out of the body, is more efficacious againſt putrid diſeaſes than one which has very great preſervative virtues. We ſhall even find, that ſubſtances which have an antiſeptic effect on the dead fibres of animals, often produce putrid ſymptoms in the living body. Though the records of phyſick do not afford an example of exemption from putrid diſeaſes by antiſeptics; though, notwithſtanding our daily uſe of infuſions of tea, of mint, of ſage, of camomile-flowers, thoſe powerful reſiſters of putrefaction, we are ſtill liable to ſuffer from putrid epidemic contagions; there are many indubitable and well-atteſted inſtances, that both the fixed and the volatile alkalies have produced putrid ſymptoms of various kinds in the human body. Theſe effects have particularly been obſerved to follow the too free uſe of Mrs. Stephens's medicine. Haller * faithfully records theſe pernicious

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* Sed in *vivente* etiam homine lixivi ſales, qui Stephaniano medicamento efficaciam præſtant, longo uſu ſanguinem

pernicious effects of the alkalies; and, when he compares theſe practical facts with the reſult of the late experiments, proving the antiſeptic properties of the alkalies, he ſeems to be quite confounded. He admits that there is a contradiction between them, which he is unable to reconcile. Had he reflected a little, he would have ſeen how, even upon his own principles, thoſe alkaline ſubſtances muſt be diſpoſed to produce theſe putrid effects in the animated machine. Exceſs of heat and motion, which he conſiders among the principal cauſes of putridity in the animal œconomy, are extremely apt to be occaſioned by theſe ſtimulating

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ſanguinem alcalinum, acrem, ſcorbuticum, hecticumque reddiderunt ut etiam veſicas de cute elevaverit *. Hinc a ſaponis uſu et a lotione linteorum proxima peſtis erumpit, et in vico Lintreariorum Conſtantinopoli amat ſævire. Vide tom. iii. p. 161. Op. Halleri de Partium corporis humani præcipuarum fabricâ et functionibus.

* Haller quotes Huxham on Fevers, and Parſons on the Bladder, to theſe facts.

alkalies. And we know that there is nothing which tends more to impair the natura irritabilis, or the vital power, gradually, than the habitual uſe of ſtimuli, the ſtrength of which we require to be increaſed, to produce the ſame effects, the more we allow ourſelves the uſe of them. It is therefore no way ſurpriſing, that the long continuance of ſuch a medicine as Mrs. Stephens's ſhould often excite putrid ſymptoms. Theſe ſtimulant effects of the alkalies have not been unnoticed by Sir J. Pringle himſelf. If putrefaction, ſays he, be begun from a languid or obſtructed circulation, the volatiles may then, by their ſtimulant and aperient qualities, be the means of ſtopping its progreſs: but if the humours be diſpoſed to corruption from exceſs of heat and motion, theſe very ſalts, by adding to the cauſe, may augment the diſeaſe. Their effects, then, being various, according to the ſtate of the living body, he propoſes his experiments on dead ſubſtances as the faireſt criterion of the nature of the volatiles; and, finding that they preſerve the dead fibre from putrefaction, he aſſerts that neither the fixed nor the volatile alkali tend naturally to promote putrefaction within the body, though he himſelf points out a method by which their moſt obvious qualities, their ſtimuli, muſt diſpoſe them to do ſo, and actually have been the cauſe of their producing putrid ſymptoms.

Plauſible as this ingenious doctrine has appeared, though it may have ſeduced many unwary perſons to accommodate their preſcriptions to it, do any prudent phyſicians rely in their practice upon antiſeptics? Let us ſuppoſe a perſon attacked with a ſudden and exceſſive proſtration of ſtrength. Let us ſuppoſe him to have a very foul tongue, with a bitter diſagreeable taſte in his mouth, accompanied with a ſevere head-ach, a ſhivering, a loſs of appetite, and a great degree of nauſea, or any other ſigns which may be conſidered as indicating the preſence of ſomething very offenſive in the ſtomach; is there any ſkilful phyſician, in ſuch a caſe, who, though his patient be very weak, would preſcribe antiſeptics; who would think of correcting this offending matter? Is there any man who would heſitate a moment to diſcharge it by an emetic? Or, if we ſhould ſuppoſe a putrid colluvies in the bowels, would not a gentle laxative be preferable to the moſt powerful antiſeptic? But if, in this weak ſtate of the patient, we muſt ſeek for ſafety in evacuations; if we cannot correct theſe offending matters in the primæ viæ, where we can apply our antiſeptic preparations in great abundance immediately to them, how much leſs are they to be truſted when, according to the common notions, the whole maſs of the blood, to which they are only applied drop by drop from the vena cava, is depraved? It will here, perhaps, be ſaid, though the patient be extremely weak, though the greater evacuations by vomiting and purging ſhould in general be avoided as much as poſſible, yet, as the offending matter lies in ſuch a ſituation as that a ſingle emetic or laxative, with the aid of a plenty of diluting drinks to waſh off any trifling impurities remaining after their operation, may be ſufficient to rid us of it, it may be proper to have recourſe to them. But had the caſe been otherwiſe, had the patient been exhauſted by a long previous illneſs, had the offending matter lain in a more remote part, and required the frequent repetition of emetics and purgatives before it could be diſcharged, then ſhould we find our antiſeptics of the greateſt benefit and the ſafeſt reſource? Theſe would enable us to change in the body that which it might be dangerous to diſcharge by conſiderable evacuations. Theſe would enable us to preſerve the little remaining ſtrength of our patient,

tient, and to guard him againſt the miſchief which ſuch impurities might produce. The putrid fever which ariſes in the confluent ſmall-pox, comes within this deſcription. In this caſe, the ſtrength of the ſick perſon has been exhauſted by a long preceding illneſs; and, if antiſeptics had the power of defeating the operation of the corrupt matter which invades almoſt from every quarter, they would be a moſt valuable acquiſition: but the truth is, we dare not truſt to ſuch protectors or to ſuch correctives, much as it were to be wiſhed, on account of the very feeble ſtate of the patient, that ſuch means might avail. The frequent repetition * of purgatives to expel the corrupt matters, with cordial and tonic medicines in the intervals to enable him to ſupport their operation, affords, under ſuch cir-

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* V. Friend de Purgatione in Febre putridâ quæ Variolis confluentibus ſupervenit. Comment. vii.

cumſtances, the only hope of relief and recovery.

It is not, however, my deſire that this ſyſtem ſhould be tried by ſuch teſts alone as I have ſuggeſted; I would make the learned author of it the judge in his own cauſe: I would ſet his own experience againſt his experiments, and would make the reſult of the former the criterion of the utility of the latter, with reſpect to medical practice. Let us examine how he treats a jail or an hoſpital fever. As ſoon as he ſuſpected a perſon to be attacked by it, he removed him from the impure air of the confined place. The modes which he uſed of preventing the diſeaſe from actually taking place, were calculated with great wiſdom, and conſiſt in evacuating medicines; in emetics, ſudorifics, and laxatives. When the diſeaſe was confirmed, he ſets about combating it more ſeriouſly. The three firſt days he gave a powder, compoſed of contrayerva, nitre, and camphire; and barley-water, acidulated with vinegar, to drink. But we are acquainted, that three or four days after the fever is formed, the pulſe ſinks, the ſtupor is great, a delirium is threatened, and petechiæ often appear. The learned gentleman, therefore, found it neceſſary to vary his method, and to have for his principal intention the ſupport of the vis vitæ; he therefore left out the nitre in the diaphoretic powders, and ſubſtituted in its place ten grains of the Virginia ſnake-root. Sometimes he gave a plain decoction of this root, at others, he gave the ſame in a quantity from two ſcruples to a drachm every day. But an accident of a mortification of the back of a man, to whom he had applied a bliſter, inducing him to give the bark * at this period, he was led,

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* Beſides this medicine, Sir J. Pringle afterwards uſed occaſionally to allow his patients in this diſeaſe Rheniſh wine, to the quantity of a quart a day; and they found it, he ſays, a very grateful efficacious cordial.

led, from the advantage derived from it, to give it at the ſame period in other caſes; and this he did with ſuch aſtoniſhing ſucceſs, that, though he was very unfortunate in the event of his former plan of practice, yet, out of thirty-nine caſes he treated in this laſt method, he loſt but four. Surely the good fortune of this accident can only be equalled by the candour of the learned gentleman who relates it. But, whilſt we are happy in the former, which has taught us ſo excellent a mode of practice, and may admire the ingenuouſneſs with which this leſſon is delivered, it ſhould not be forgotten, that the camphire, which is three hundred times more antiſeptic than common ſalt, aſſiſted by the preſervative virtues of

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dial. It muſt have been by its ſtimulant qualities that it rendered benefit; for the Rheniſh wine poſſeſſes very weak powers as an antiſeptic. V. Eſſai pour ſervir à l'Hiſtoire de la Putrefaction, p. 208.

the nitre and contrayerva, are but of little uſe. For petechiæ appear on the third or fourth day; the pulſe is obſerved to be ſinking ſo faſt, that the ſerpentaria is ſubſtituted in the place of the nitre. But the combined powers of the camphire, the ſerpentaria, and the contrayerva, though they ſtand foremoſt in the liſt of antiſeptics, are inefficacious. The bark, which is inferior to them in antiſeptic virtue, exceeds them in its ſalutary effect as a remedy. Had the diſeaſe ariſen from a putrid ferment aſſimilating our blood and humours to its own nature, ſurely the moſt ready way to have ſtopped it would have been (as Sir J. Pringle, reaſoning juſtly on his own principles, actually attempted) to have ſtruck at the cauſe of the miſchief, and to have corrected the putridity of our fluids by ſuch things as exert the ſtrongeſt antiſeptic power on their mixture, ſuch as camphire, &c. But whilſt he practiſed in this way, he was unſucceſsful. The bark, which acts on the moving fibre, which produces a tonic effect on the ſyſtem, which renders its benefit whilſt it is yet in the ſtomach, before it can poſſibly be blended with the circulating fluids, and of courſe long before it can exert any preſervative virtues on their mixture, is more effectual than the moſt boaſted antiſeptic. So quick is its operation in fevers, that Sir J. Pringle himſelf confeſſes, for that reaſon, that its febrifuge qualities muſt be different from its antiſeptic ones.

As I have maintained that the diminution of the vital power, whatever the remote cauſes of this effect may be, is the proximate cauſe of putrid fevers, and the immediate ſource of thoſe ſymptoms of putridity which attend them; ſo this obſervation with reſpect to the cure of them, is a ſtrong confirmation of my doctrine. In oppoſing the putridity of the fluids, which was ſuppoſed to conſtitute the proximate cauſe of theſe diſeaſes, with antiſeptics, we did very little to ſtop their progreſs, or to abate their virulence: but we are no ſooner taught to ſupport the vital power with tonic and ſtimulant medicines, than we experience the moſt pleaſing change in the effect of our preſcriptions. The flaccid weakneſs of the fibres, with every ſymptom of putridity, ſoon ceaſes, upon the correction of the cauſe from which it ſprung.

I think I may be juſtified in concluding, from what has been ſtated, that the effect of any ſubſtance in preſerving the dead fibres of animals from putrefaction, is by no means a rule by which we are to judge of the propriety of exhibiting it, or of the advantage to be derived from the uſe of it in a putrid diſeaſe. Many things, which in the furnace or the elaboratory of the chymiſt reſiſt putrefaction powerfully, have no ſuch operation in the animal machine. The habitual and daily uſe of antiſeptics does not prevent putrid diſeaſes. The application of the moſt efficacious ones does not cure them. The vegetable acids are ſerviceable by gently promoting the proper excretions by the ſkin and by the kidneys. When their operation by theſe means is increaſed, and the body at the ſame time ſtrengthened by warming ſtimulant additions, they are rendered more beneficial. The bark operates by its tonic ſtrengthening powers. But if the vegetable acids, or the bark, poſſeſſed only antiſeptic qualities, they would probably be uſeleſs in putrid caſes. The root of the wild valerian is one of the moſt powerful antiſeptics out of the body which is at this day known. It is ſuperior in that reſpect to the vegetable acids, and to the bark. It has no qualities which ſhould limit us, either in the quantity, or in the mode of giving it. It may be exhibited in ſubſtance, in decoction, in infuſion, and in tincture. But it is a medicine of no virtue in a putrid diſeaſe. Guaiacum, after it has been almoſt exhauſted by repeated decoctions, has ſtill communicated ſuch properties to water, as to enable it to render meat immerſed in it unſuſceptible of change; and yet, in the exigency of putrid fevers, it is neither preſcribed nor relied upon. In the ſcurvy, as in the venereal diſeaſe, guaiacum may be beneficial by promoting the proper diſcharges by the ſkin. But if in the latter caſe the vital power be diminiſhed, and the patient be much weakened by the long and continued uſe of mercury, the decoction of guaiacum, taken daily and copiouſly, will not prevent a tendency to putridity: it will not prevent the offenſive ſmell, the foul breath, &c. attendant on that condition. The antiſeptic nature of the alkalies has not hindered them from producing putrid ſymptoms in the living body.

To be aſſiduous then to aſcertain the antiſeptic operation of any matters in a crucible or a furnace, ſeems, for the purpoſes of phyſick, to be labour miſapplied. To ſay that, " becauſe any ſubſtance under ſuch circumſtances is antiſeptic, it muſt therefore be of uſe in putrid diſeaſes," is a fallacious concluſion, neither warranted by reaſon or experience. The means of preſerving dead ſubſtances from putrefaction, are no way applicable to the living moving fibre, which is governed by a different law, a law peculiar to itſelf. The ſeat of putrid diſeaſes is in the ſolids. The cauſes which induce them impair the moving fibres, and require medicines which act upon the ſame parts of our machine to correct them. Hence it is that putrid diſeaſes are but little affected by ſuch things as operate only upon the mixture of our fluids, which is the caſe of thoſe matters which are merely antiſeptic. It may perhaps be ſaid, that Sir J. Pringle himſelf, in many important particulars, diſcovered accidentally a mode of practice more efficacious than that to which his doctrine of antiſeptics at firſt led him ; that he deferred to experience, and made it the guide of his preſcriptions; and that, as he has taught us to avoid the miſchief which his ſyſtem might occaſion, any obſervations on the futility of it are at this time unneceſſary. There is no one, I am ſure, who is more diſpoſed to do juſtice to the learned gentleman than myſelf; and was I certain that every one, who had learnt the doctrine of antiſeptics, would forget it at the bedſide of his patient, and make his example the rule of his practice, I might have foregone the unpleaſant taſk of criticiſm, which I have unwillingly executed. But I have had occaſion to hear the doctrine of antiſeptics taught in places where the learned gentleman's mode of treating diſeaſes is very little followed; in places where ſtrong prejudices againſt the bark ſtill remain, and where people would be glad to avail themſelves of the plauſible pretence of exhibiting a more powerful antiſeptic, to poſtpone the uſe of it. In the various ſchools of phyſick, too, which it has been my duty to frequent, it has not been uncommon for ſtudents to poſſeſs liſts of antiſeptics, arranged according to their comparative power of reſiſting putrefaction in the dead fibre, and to paſs from the College to the exerciſe of their profeſſion, more impreſſed with the ingenious theory which has been mentioned, and with the utility of ſuch catalogues to aſſiſt their preſcriptions, than fraught with proper rules to direct their practice. It may poſſibly be uſeful that ſuch perſons ſhould be apprized of the fallacies I have pointed out; and it will ſurely be more for the intereſt of mankind, that they ſhould conſider them at their entrance into buſineſs, than that they ſhould learn the groundleſſneſs of theſe theoretical opinions in the diſappointed hope of relieving their patients, or that they ſhould wait for ſo fortunate an incident as occurred to Sir

J. Pringle, to be informed of the errors into which they muſt neceſſarily be led by adopting his ſyſtem.

FINIS.

J. Pringle, to be [illegible] of the errors into which they muſt [illegible] be led by adopting his *ſyſtem*.

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